# ELECTRICAL REVIEW

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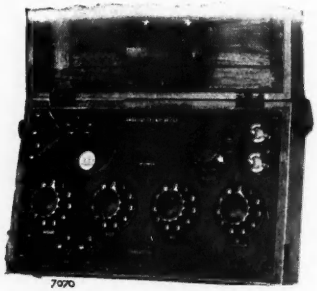

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ELECTRICAL REVIEW 28th NOVEMBER, 1952

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# Workers' Control

THE Electrical Trades Union still holds to the view that nationalization was designed primarily for the benefit of the workers in the industry and that provision should have been made for a larger measure of workers' control. In its monthly journal, *Electron*, there are reproduced replies sent by the Union to a questionnaire from the Labour Party Research Department upon joint consultation in nationalized industries. The Union thinks that while the consultative system in the electricity supply industry may be superior to that of certain other nationalized industries, a disturbingly low proportion of recommendations comes from the rank and file while a disturbingly high proportion of recommendations is being rejected by the Area Boards. Its remedy for this is workers' representation in the control of the industry.

The Union has gone through our " Electrical Who's Who " to find what sort of people form the B.E.A. and Boards and its conclusion is that " 46 of the 114 were representatives of the employing and landowning class." Only 21 represented " the Labour Movement as a whole." It is therefore proposed that the 1947 Electricity Act should be amended to provide for a Central Authority of eleven members and Area Boards with nine members, of which five and four respectively should be " nominated by organizations whose members are employed in the generating and supply of electricity."

Similar proposals were explored by the Economic Committee of the T.U.C. in 1948 and the conclusion then was that such an arrangement would destroy the independence of the trade unions and would place the unions' representatives in an embarrassing position " unsatisfactory to themselves, the board and to the workpeople concerned." The Committee realized that there was a considerable difference between the qualifications required to run a trade union and those needed for controlling a commercial undertaking. Whether the T.U.C. still holds the same views we do not

know but we endorse those views, as we did in 1948. Trade unionists who have been appointed members of Electricity Boards have quickly discovered that they cannot serve two masters—the general public and their trade unions. They have accordingly, and rightly, placed the public welfare first, and in doing so have become unpopular with their unions. Workers' claims and public welfare may not be always in consonance.

## UNAVAILING "GESTURE"

In June last and again in September the Electrical Power Engineers' Association decided to defer its claim for an increase of salaries for its members in the hope that others would exercise similar restraint and thus prevent a further rise in the cost of living. It was a vain hope: in the last few months practically everybody else in the electricity supply industry has successfully demanded higher pay. Consequently the Association decided that it could no longer maintain its altruistic attitude (which has been unwelcome to many members). It proceeded with its claim at the 18th November meeting of the National Joint Board and increases (noted in this issue) were secured.

## STEEL BOARD'S POWERS

The chairman of the B.E.A.M.A. Council, with other leaders of the engineering industries, believes that there are dangers to engineering production latent in the Iron and Steel Bill. General supervisory powers to be bestowed upon the proposed Iron and Steel Board will give it jurisdiction over the casting, rolling and forging activities of engineering concerns, although these activities are merely incidental to their main production. It is feared that the exercise of these powers will disrupt the unified organizations of which the iron and steel handling units form a part and amendment of the Bill to remove this possibility is called for. On the other hand, Mr. W. S. Sheppherd, M.P., has expressed the view that such supervision is in the engineering firms' own interests—mainly because it will ensure the proper allocation of raw materials. This may be all right if the engineering industries are not forced to play Lazarus to the iron and steel industry's Dives.

## POWER STATION SITES

Finding sites for its new power stations is a major difficulty facing the British Electricity Authority. It would not have been thought, however, that electrical "utilities" in the United States, with its vast territory, were facing the same problem and yet the *Electrical World* suggests that they are. It says that suitable sites are becoming scarce and the freedom of selection is limited (as in this country) by the objections of local interests. Consequently power companies have had to place new plants in spots far from load centres or service facilities and "should certain legal actions now pending be sustained, it may be almost impossible for utilities to secure suitable waterfront properties."

## CROP DRYING

That farm mechanization means much more than the replacement of manpower and animal power by machinery was well illustrated by Messrs. C. A. Cameron Brown and P. G. Finn-Kelcey in their I.E.E. paper, reported on another page. A wide complementary field lies in the application of science and engineering to the processes of nature, the most prominent of which is the drying and ripening of many kinds of agricultural produce. The load should be attractive to supply undertakings, as its electrical demand could be made to occur mainly off-peak. It is of more than usual importance, however, that those concerned with developing this load should not only understand its special technical aspects but should be able to speak the farmers' language.

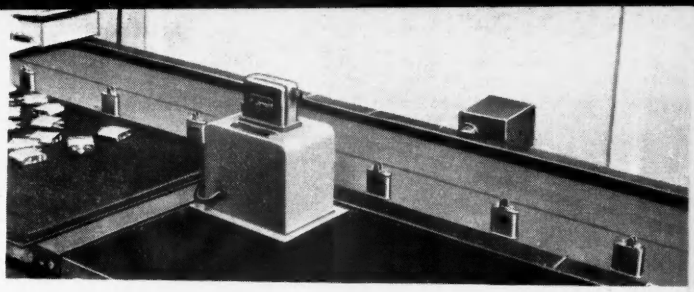


Photo-electric counter fitted on the final inspection and packing conveyor

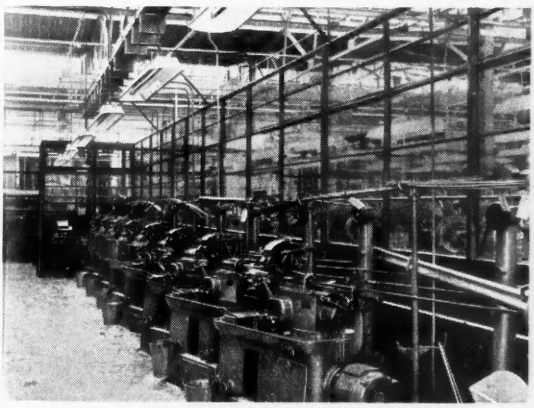
# Petrol Lighter Manufacture

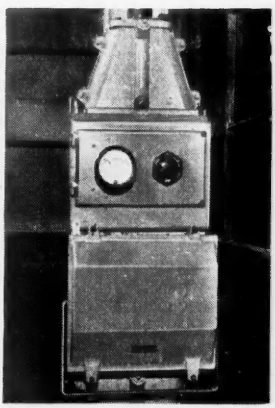
## *Well-Planned Electrical Distribution System*

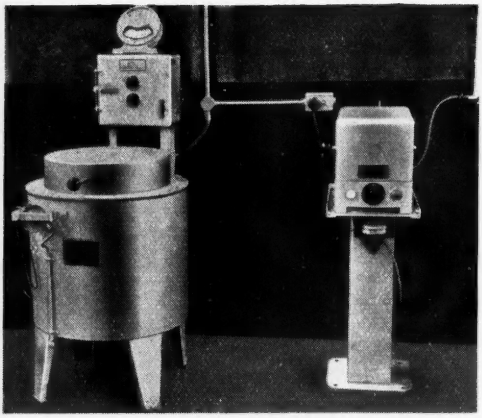
FOR a factory making such small devices as petrol lighters provision for a maximum demand of 600 kW might appear excessive. Yet such is the manufacturing output planned by Ronson Products, Ltd., that this is an estimate of the electrical requirements at its new works at Leatherhead within the next few years. Already in the first section of the factory opened recently and now producing lighters at the rate of about 1¼ millions a year, the maximum demand has risen to 237 kW and is expected before long to reach 300 kW.

An 11 kV supply from the South Eastern Electricity Board is received at the works substation via a Statter ring main unit which feeds a 500 kVA 11 kV/400 V/230 V Hackbridge outdoor transformer. The l.v. supply is controlled by a main 1,000 A Johnson & Phillips oil circuit breaker (trip coils wound temporarily for 500 A), being subdivided and separately controlled by three 400 A four-core cable units (W. Lucy & Co., Ltd.), equipped with h.r.c. fuses to feed three main points in the factory through 0·2 sq in four-core cables. At the factory end these three cables are controlled by 300 A four-pole switch-fuses (G.M. Engineering (Ottery St. Mary), Ltd.), which are fitted with ammeters and selector switches to permit balancing of phases.

*Left:* **Bank of automatic machines showing overhead busbar system.** *Right:* **The three feeders to the factory are controlled by 300 A four-pole switch-fuses fitted with ammeter and selector switches to permit balancing of phases**







**Two small electric furnaces (4 kW and 1½ kW) are available for annealing**

Distribution in the factory is carried out by means of a G.M. Engineering overhead busbar system, three U-shaped runs of trunking forming the background for the whole of the factory and office supply. The scheme provides for 30 A local fuses for the machinery with additional 5 A fuses for lighting.

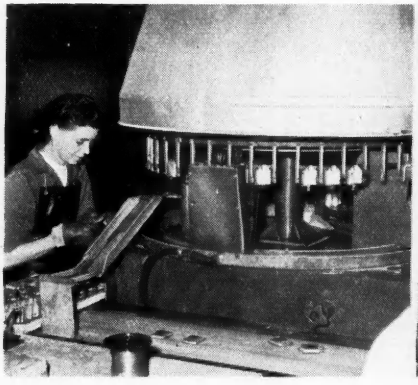
For use in the event of a failure of the grid supply or for service during peak periods to avoid the necessity for load shedding a limited standby supply is provided by a General Motors 65 kW diesel generating plant supplied by Newman Industries, Ltd., transferred from the company's old works. Arrangement is made to serve one of the three factory feeders referred to, with provision for meeting the emergency lighting requirements of the whole factory.

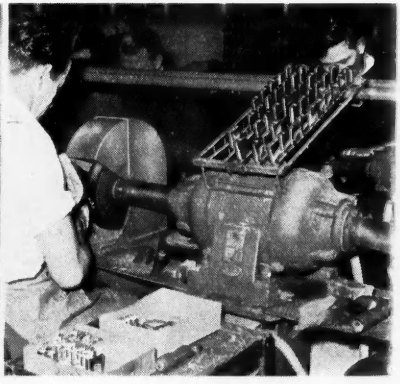
A varied assortment of electrical equipment is used in the works. In the tool room machines of exceptional precision include a jig borer kept at a constant temperature in a separate compartment to work to an accuracy of 0·0001in. Seventeen automatic machines (mainly Petermann and B.S.A.), individually driven by B.T.H. and Laurence, Scott 2 or 3 h.p. motors, produce screws, bushes, etc. Other components are made on presses of which a dozen supplied by Power Presses, Ltd., are driven principally by Brook motors. Two small Wild-Barfield furnaces (4 and 1½ kW) are available for annealing.

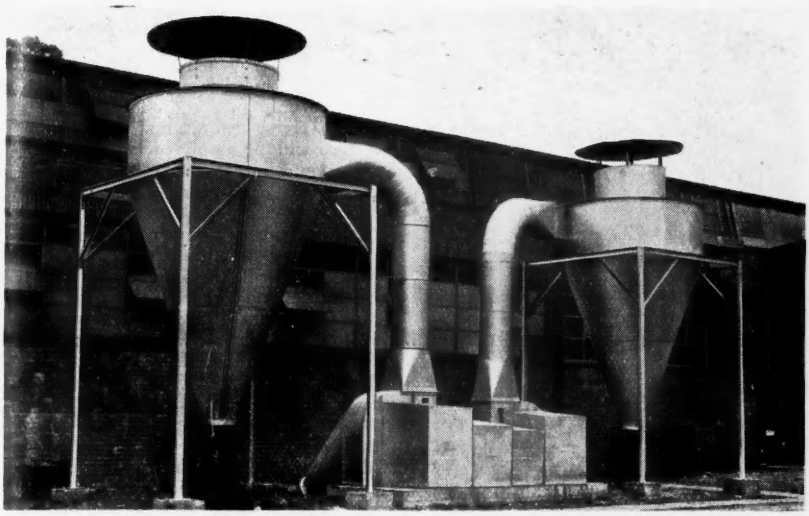
In the soldering department, where assembly commences, the soft soldering of the top and bottom casings of the lighters is undertaken on a 7½ kW three-phase high-frequency unit supplied by Applied High Frequency, Ltd. Electrically driven conveyors are employed to carry the lighters between processes. After soldering, the lighters are trimmed, inspected and pressure tested to ensure that they will not leak. Providing the compressed air for this latter process and other uses throughout the factory is a B.E.N. compressor driven by a Higgs 15 h.p. motor.

The lighters are then polished—each of the 34 polishing machines has a 2 or 3 h.p.

*Left:* **Soft soldering of the top and bottom casings of the lighters is undertaken on a 7½ kW high-frequency unit.** *Right:* **Polishing the lighters preparatory to plating**







**Dust extracting plant serving the polishing department**

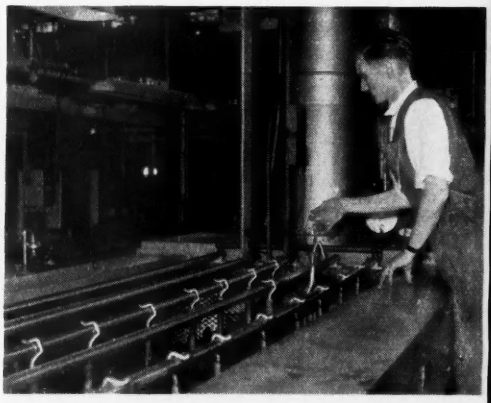
motor—and then degreased preparatory to plating. For removing the dust two extract fans (20 h.p. Brook motors) have been provided by Utilities, Ltd., who were also responsible for the supply of the extensive fluorescent lighting fittings in the works. The General Electric Co., Ltd., supplied the fluorescent fittings in the offices and Troughton & Young, Ltd., the decorative wall brackets in the conference room.

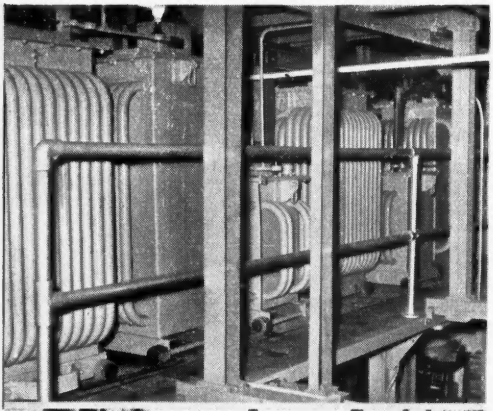
About 42 kW of load is provided by the plating department which has been equipped by R. Cruickshank, Ltd., with steam heated vats, "Westalite" rectifiers and "Breco" voltage regulators. The effluent from the plating shop is treated chemically in order to eliminate obnoxious constituents, and the results are continuously tested and recorded by an M28 industrial pH transmitter made by Electronic Instruments. The plating vat control panels of the remote control relay operated type are completely up-to-date and were also supplied by R. Cruickshank, Ltd.

Some of the lighters are enamelled. In the spraying department flameproof lighting supplied by the Beacon Electrical Co., Ltd., has been installed. Compressed air from the B.E.N. equipment previously referred to is utilized, hardening and drying being carried out by means of Barlow Whitney ($3\frac{1}{2}$ kW) and Brown's cabinets (3 kW). Decorative effects on the casings are produced by engine turning carried out in the same department.

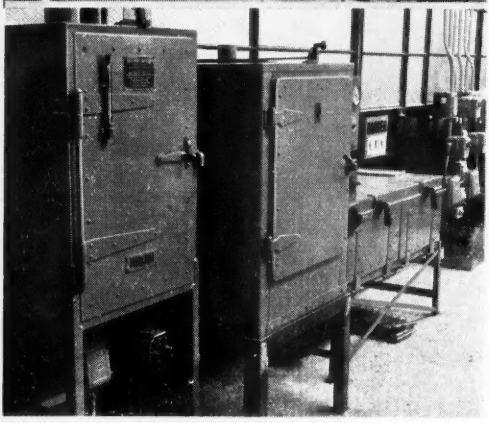
In the assembly and packing department a photo-electric counter (Henry A. Paterson & Partners, Ltd.), is employed on one of the conveyors. Dust is removed by means of B.V.C. industrial vacuum cleaning plant. For use largely in connection with the drawing office a printing room is provided

**One of the chromium plating vats**





A portion of the plating rectifier and voltage regulator equipment



Hardening and drying ovens used after spray enamelling

with a "Rectophot" printing machine and an "Arclight" photo-copier. The building is equipped throughout with International Time Recorder clocks, a Magneta public address system, and Gent bells. Further applications of electricity are to be found in the canteen kitchen where apparatus includes a Hobart mixer, Peerless potato peeler and a "Senior" refrigerator.

For space heating and process work provision is made for five boilers, three having so far been fitted. These are of John Thompson construction and each has an evaporative capacity of 10,000 lb/hr; they were installed by Engineering Services Installations, Ltd. The boilers are fitted with Ashwell and Nesbitt stokers and both forced and induced draught fans, driven by 3 h.p. Crompton Parkinson motors. A Ronald Trist system automatically controls the Weir pumps supplying the feed water. Boiler house operations are indicated and recorded by Cambridge instruments.

Apart from the lighting apparatus already mentioned, special reference is merited by an "egg-box" illuminating scheme selected for the entrance hall. It has been made up by A. Edmunds and comprises thirty-two 80 W fluorescent lamps. Exterior lighting of the building has been carried out by means of seventeen Concrete Utilities "Avenue 2D" columns and brackets with Brighton Lighting & Electrical Engineering Company's No. 611 lanterns and 45 W Philips sodium lamps.

The whole of the electrical installation for the factory was carried out by Ronson's own Electrical Department under the supervision of Mr. F. H. Eberl, the chief electrical engineer who planned the layout.

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## Ship to Shore Underwater Television

SUCCESSFUL trials have been completed in H.M.S. *Reclaim* with equipment for relaying underwater television pictures from ship to shore. The trials, the first of their kind, were carried out during two days early in September in the Portsmouth area with an experimental transmitter designed and produced by Pye, Ltd. This ship-to-shore link was used in conjunction with the underwater television equipment already installed in the *Reclaim*.

Clear television pictures were received ashore from the seabed some 16 miles distant and 100ft below the surface of the sea. This by no means represents the full range of the ship-shore link or the maximum operating depth of the television camera. Viewers in Portsmouth were able to see a diver, fishes and crabs illuminated by the powerful light associated with the underwater television camera.

The ship-to-shore transmitter was supplied from the normal ship's a.c. supply, the input being 2·8 kW at 240 V 50 c/s supply. The output of the transmitter was theoretically 500 W, but it was estimated that its actual output during the trials was in the order of 250 W r.f. At the shore station the signals were frequency-converted, amplified and fed in a closed circuit to a number of standard receivers.

# Artificial Drying of Crops

## *Application of Electricity Discussed*

BASIC principles of crop drying by electricity and their practical application formed the subject of a paper presented before the Institution of Electrical Engineers (Utilization Section) on 20th November by Messrs. C. A. Cameron Brown (B.E.A.) and P. G. Finn-Kelcey (E.R.A.). Modern trends towards taking the maximum advantage of the drying properties of untreated air, the authors held, favoured electrical methods, with especial reference to barn curing, in relation to the present high cost of living.

If 10 per cent of the hay crop in Great Britain were treated by cold blowing, finishing with heat, the annual consumption would be 600 million kWh and the connected load 1,000 MW, much of it used only at night; farm electrical equipment would cost about £6 million. One-third of the grain crop so treated would require 150 million kWh for 300 MW connected at a cost of £4 million. A wider range of blowing and heating apparatus was needed —particularly for single-phase axial-flow directly coupled fans. It would be worth while to design platform dryers as used for grain drying, for application as multi-purpose machines on small mixed farms.

Grass drying presented more difficulties economically (the moisture content having to be reduced from 85 per cent to between 5 and 10 per cent), but a substantial summer power load was associated with it. Hop drying with conventional oasthouses was inefficient thermally and apart from ancillary machines, little scope existed for electrical drying without drastic redesign.

The importance of correct approach to farmers was emphasized. The paper contained numerous performance data.

### DISCUSSION

Mr. J. I. Bernard (E.D.A.), opening the discussion, emphasized the tremendous scope for the use of electricity for drying on the farm and the need to give greater attention to this load.

Mr. F. E. Rowland (G.E.C.) called attention to the dangers of relying on imported fuel oil for food production, and pleaded that in any revision of electricity tariffs the applications under discussion should receive special consideration.

Mr. J. W. Hawkins, a farmer, said that methods of mechanization on farms must be cheap in installation, in maintenance and in running costs; they had also to be simple in application and operation, which was where electricity scored. The electricity industry must go after the business, either by setting up its own organization or in partnership with agricultural engineers.

Dr. L. Hartshorn expressed the conviction that where the actual production of heat was not the main feature, but rather the spreading and application of heat at the right time and under the right conditions, electricity had unique advantages. He had seen drying carried out with coke, which seemed to introduce the worst conditions of the Industrial Revolution on to the farm, whereas electrical installations would not spoil the attraction of farming. Farming, however, remained a craft. These devices in the hands of a good farmer would enable him to bring about great improvements.

### Tariff Structure

Mr. H. J. Gibson (Midlands Electricity Board) maintained that Electricity Boards were alive to the importance of the farming load and doing all they could to train farmers to become engineers and engineers to know something about farming. Tariffs would not necessarily be the same all over the country; their structure was in effect a two-part tariff whose secondary charge included a contribution to capital charges. The amount of drying plant was necessarily high compared with the kWh consumed, so that the fixed charge had to be increased, but on most farms the fixed charge was met by supplementary uses, so that grain drying and so on came on the secondary charge. The average price of electricity for farm purposes was only slightly over a penny. For very large heating loads, however, it

was difficult for electricity to compete with oil, but much might be done by the development of the contra-flow principle of drying. A good many all-electric grain drying plants in the Midlands, installed by corn merchants, were used by farmers, who would not change from electric operation because of its convenience and other advantages.

Mr. D. F. Lott called attention to the advantages of drying grain on an existing flat floor by placing ducting in the floor to introduce warm air under the grain. Very little capital expenditure was involved, and when the grain had been removed the building could be used for other purposes. For picking up the grain conveyors using suction would probably be introduced, thus enabling the method to be employed on small farms, the grain being handled in bulk right from the combine.

Mr. W. Cover said that many Boards at present offered off-peak tariffs which would be acceptable so long as the kWh charge was not loaded with a kW charge for the connected load. He believed that an all-purpose dryer was likely to be introduced in the near future. By being able to store grain during the winter farmers could more than cover the cost of the electrical installation. He also called attention to the dangers of "home-made" installations, and showed a picture of one in which a 2 kW fire was laid on its back without fuses or other protective devices.

Mr. G. C. Kim referred to the drying of grain in central establishments which dealt with up to 12,000 tons during the harvest period. The load of perhaps 1,300 kW might, however, be a little unwieldy in remote country districts.

Mr. E. C. Claydon (South Eastern Electricity Board) reported having successfully dried grass without pre-wilting. With the high prices obtainable for the product, even with drying costs approaching £10 per ton, the advantages of the method would justify its use. The platform dryer had become very efficient and in Sussex about 12 kWh per ton would secure 1 per cent of moisture reduction. With such low figures the cost of electricity for heating was unimportant, and economically there was nothing to fear from oil. The incidence of the maximum demand charge could be varied at the discretion of the Board, and could safely be low for good farming loads.

Mr. S. F. Osborne referred to a recent advertisement by an Electricity Board for qualified agricultural development engineers, with extensive experience in the development of electricity in agriculture, capable of advising farmers on the application of electricity, choice of tariffs and installation work. The salary offered was £480 per annum, which hardly suggested enthusiasm on the part of the Boards to develop the use of electricity in agriculture.

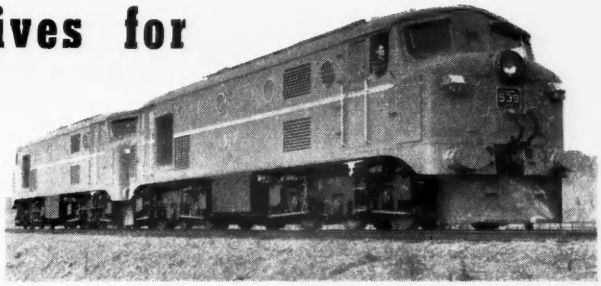
Messrs. E. Mead and R. P. David also took part in the discussion. Mr. P. G. Finn-Kelcey, in reply, said that on a three-man farm the man-hours required for the electric drying of grass in a hay dryer were lower than for traditional haymaking, and the quality of the product was very much higher. The farming community would be satisfied with a flat tariff of $1\frac{1}{4}$d/kWh, apart from the four winter months, with no installed or maximum demand charges. A grain dryer in the Eastern Counties was an insurance against a wet season, and the farmer should not be penalized if he used it only for a few odd tons of grain. Infra-red equipment had not been used for crop drying; infra-red lamps were not always successful in dusty atmospheres and were likely to use more electricity than resistance-type air heaters. With an all-purpose dryer the summer load factor should be almost 100 per cent.

## Farm Mechanization

SPEAKING at the annual dinner in Glasgow on 18th November of the Scottish Centre of the Institution of Electrical Engineers, Sir John Urs Primrose, Lord Provost of Perth, said that electricity had done a great deal for Scottish farming. Everyone admired Scottish farming, but it was not everyone who realized that it was the most highly mechanized farming in the world. Sir John was replying to the toast of "Guests & Kindred Institutions" proposed by Mr. W. S. Sawtell, deputy chairman of the South East Scotland Electricity Board.

Mr. T. E. Goldup, vice-president of the I.E.E., replying to the toast of "The Institution" proposed by Sir Murray Stephen, chairman of Alex. Stephen & Sons, Ltd., and a former director of the Clyde Valley Electrical Power Co., referred to the growth of the institution over the years. In 1871, he said, the membership of the first organization, the Society of Telegraph Engineers, was 110. By 1920 it was 8,444, and to-day they had a membership of about 38,000. "The Scottish Centre" was proposed by Mr. W. K. Brasher, secretary of the Institution, and the toast of the chairman by Mr. C. H. A. Collyns, vice-chairman of the Centre.

# Locomotives for Ceylon



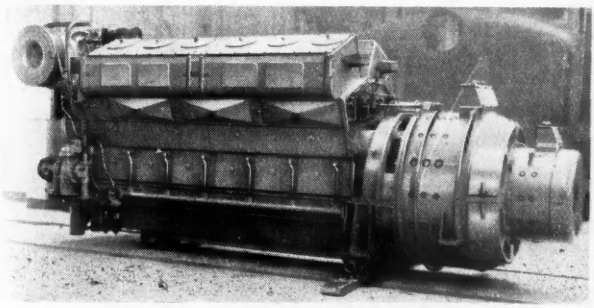
## *Brush 1,000 H.P. Diesel-Electric Units*

LAST week we inspected at Loughborough some of the twenty-five 1,000 h.p., 5ft 6in gauge, diesel-electric locomotives which are being built within the Brush Aboe group to the order of the Ceylon Government Railways. This is the first contract for main-line diesel-electric locomotives to be undertaken by the group and it is valued at some £1,038,500. The design and erection of the locomotives are being carried out by Brush Bagnall Traction, Ltd., while the electrical equipment is being supplied by the Brush Electrical Engineering Co., Ltd., the diesel engines by Mirrlees, Bickerton & Day, Ltd., and mechanical parts by W. G. Bagnall, Ltd.

The locomotives are of the A1A-A1A type, the superstructure being mounted on two bogies, each having three axles of which the two outer axles are motored. The locomotive superstructure has a driving cab at each end mounted behind a short, streamlined, nose end compartment. The power unit, with auxiliary equipment and control gear, is mounted in the main body of the locomotive. A partition separates the engine from the generator and control equipment, while the walk-ways on each side of the power unit allow adequate room for maintenance.

Both driving cabs are fitted with a driver's position and controls on the left-hand side of the cab with an assistant driver's position on the right-hand side. All instruments essential to the driver are mounted on a panel in front of the driver and his assistant. Unobstructed vision for both men is provided by large windows furnished with pneumatically operated windscreen wipers. A 250 W headlamp is fitted at each end of the locomotive.

**The power unit comprises a 12-cylinder 850 r.p.m. 1,254 b.h.p. oil engine direct coupled to a 652 kW main and 35 kW auxiliary generators**



Immediately behind No. 1 cab is the main radiator ducting carrying the radiator fan motor and runner. Air is drawn through the radiator panels, which are mounted vertically on each side of the locomotive, and after passing through the twin branches of the ducting is ejected upwards through a grille in the roof. Access to the main body of the locomotive is

provided by doors in the cab bulkheads. There are also doors provided in the partition separating the engine and generator compartments and there are walk-ways on each side of the main and auxiliary generators, exhausters, compressor and control equipment cubicle.

The nose end compartments in front of each driving cab contain an electrically driven traction motor blower which supplies filtered air to the two traction motors in the bogie beneath. Access to the nose compartment is by removable panels inside the cab and by hinged louvred panels on the outside of the locomotive nose.

All auxiliaries are electrically driven with the exception of the engine cooling water circulating pump, which is belt driven from the free end of the crankshaft, and the engine lubricating oil pumps, which are gear driven from the crankshaft. Power for the auxiliary machines is taken from the auxiliary generator mounted on an extension of the main generator shaft.

The main fuel tank and batteries are slung beneath the locomotive between the bodies, a separate fuel service tank being mounted in the roof. Because of the bad weather conditions encountered in Ceylon, which include tropical rain and heavily corrosive salt atmosphere, special care has been taken to make all ventilating and air inlet louvres waterproof, and anti-corrosive materials have been used throughout the construction of the locomotive.

**Interior of driving cab of Brush Bagnall 1,000 h.p. diesel-electric locomotive for Ceylon**

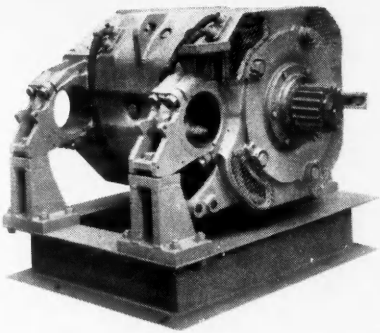
The locomotive is powered by a V-type 12-cylinder, turbo-charged four-stroke oil engine, with a rating of 1,254 b.h.p. at 850 r.p.m. in normal temperatures and altitudes. Under site conditions in Ceylon, the engine develops 1,000 h.p. at 850 r.p.m.

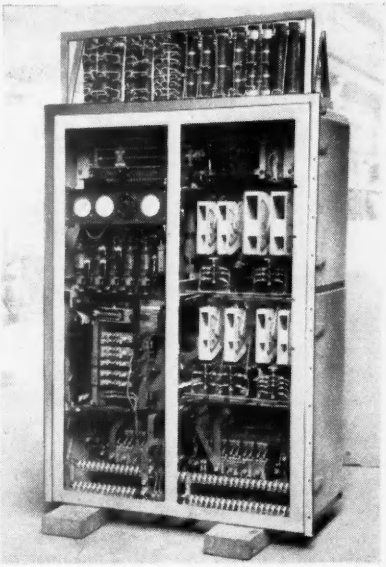
The engine is started by motoring the main generator from starting batteries slung beneath the underframe. Starting connections cannot be made until sufficient oil pressure has been built up in the engine by an electrically driven priming pump. Fuel oil is delivered to the engine fuel rail under pressure by an electrically driven fuel transfer pump. In the event of failure of this pump, fuel is supplied from a service tank under gravity feed. A semi-rotary fuel transfer pump is provided for filling the service tank from the main fuel tank.

The main generator is directly coupled to the diesel engine and provides power to the four traction motors, which are axle hung on the outer axles of the two bogies. The motors may be connected in series-parallel, full-parallel, or arranged so that an initial connection in series-parallel is regrouped automatically to full-parallel. The main generator has a continuous rating at 850 r.p.m. of 652 kW at 630 V and 1,035 A or 653 kW at 750 V and 870 A, while the traction motors have a continuous rating of 196 h.p. at 315 V 517·5 A and a one-hour rating of 226 h.p. at 315 V and 610 A.

Control of the locomotive is effected by varying the excitation of the main generator and the speed of the diesel engine. Current for the field excitation of the main generator, auxiliary machines, battery charging and operation of the control equipment is supplied from the 850 r.p.m. 35 kW 110 V 318 A auxiliary generator which is overhung from the main generator.

The main control cubicle is mounted in the generator compartment and is provided with doors giving full access to all of the equipment inside. The cubicle is dust-proof, and special care has been given to





*Above:* **One of the axle-hung nose-suspended 196 h.p. 315 V four-pole motors.** *Right:* **The control gear cubicle**

the design of the control equipment to make it suitable for the arduous conditions of railway working.

The locomotives are arranged for multiple unit operation by which means two locomotives are coupled electrically as well as mechanically and operated together by a driver in the leading locomotive. A single handle on the master controller enables the driver to select "engine starting," "forward" and "reverse" positions and all running notches.

Lead-acid batteries of 192 Ah capacity are provided for starting the main power unit and for supplying the necessary auxiliary power when the diesel engine is not running.

The driving axles are fitted with tubes for the axle suspension of the traction motors, the nose of each traction motor being suspended by a flexible link from the centre transom. The traction motors are fitted with roller bearings for both the armature and suspension bearing. The drive from the motors to the axles is taken through 82 : 16 single reduction gearing, a pinion on the armature shaft meshing with a resilient gear wheel on the road axle.

The locomotive is fitted with electrically driven twin Westinghouse reciprocating exhausters to provide a vacuum for the train brakes. The locomotive itself is braked by compressed air brakes, four brake cylinders being fitted to each bogie and operating clasp brakes on all wheels. A Westinghouse compressor provides compressed air for the locomotive brakes, and also for the control and other auxiliary equipment.

The underframe of the locomotive is constructed of four main rolled steel "I" sections, which are reduced in depth over the bogies. The two outer main members terminate at the bogie centre cross members, to which they are welded, but the inner main longitudinals continue and are welded integral with the fabricated drag box. Cross members riveted to the main longitudinals at various points along the underframe carry channel section sole-bars, and an unbroken deck of steel plate covers the underframe skeleton. The superstructure is constructed in sections comprising the two cab ends, two sides, and three roof sections from 14 gauge steel sheet welded to frameworks of angle and top hat section.

The bogies are constructed from box type side frames of welded construction joined by a heavy fabricated steel centre transom, and by two channel members as headstocks. The weight of the locomotive is carried on the centre bolsters of the bogies. Each bolster rests on eight nests of coil springs carried on two spring planks, one on each side of the centre carrier axle of each bogie. The spring planks in turn are suspended by swing links from the bogie side frames. Electro-pneumatic sanding gear is provided for the outer axles of each bogie.

# VIEWS on the NEWS

*By REFLECTOR*

IN the *Electrical Review* of 14th November I made some comments on the American use of " psi " or even " psig " for denoting steam pressures and expressed my preference for " lb/sq in "—the British method. Mr. K. R. Lenel, of London, N.W.6, says that although he generally agrees with my remarks he cannot do so in this matter. He considers that the American way is much clearer and requires less time to read or write. Mr. Lenel also thinks that the general recognition of " psi " would bring it into line with " atii " or " ata " commonly used on the Continent.

* * *

Mr. G. P. Cooke of Luton, Beds, comments on my note on the recent B.B.C. discussion on " What Sort of Heat? " and Mr. G. A. T. Burdett's letter in the *Electrical Review* of 14th November. He reflects upon the low average thermal efficiency of power stations—25 per cent—and says that an efficiently designed solid fuel stove can easily work at double this figure. Mr. Cooper's " easily " is generous and he ignores other considerations such as the distribution and storage of coal, the disposal of ash and other inconvenient concomitants. He also questions Sir Vincent de Ferranti's statement that power stations use coal which cannot be exported, suggesting that if the B.E.A. burns this coal, overseas authorities could also do it. They probably could, but are hardly likely to buy the stuff from us.

* * *

It is said that there may be trouble in Scotland if any attempt is made to set up a separate electricity authority for the whole of that country. The Government's intentions, though vaguely mentioned in the Queen's Speech, are still unknown but champions of the North of Scotland Hydro-Electric Board are ready for battle if it is proposed to merge the Board in any other body. Two Scottish M.P.s expressed their determination in the *Inverness Courier* of 18th November to oppose any move of this kind. One of them, Mr. Tom Oswald, said:—" ' On Guard ' is rightly the rallying call for all who are really interested in rescuing Scotland from being the ' Cinderella ' of the United Kingdom." But surely the " ugly sisters " are the other two Scottish Electricity Boards.

* * *

Not everybody in Wales is pleased at the British Electricity Authority's decision to withdraw its Welsh water-power Bill. The writer of a letter to the *Western Mail* (Cardiff) makes some acid references to the North Wales Protection Committee, which has campaigned against the water-power development and he contends that in spite of what this committee says the proposed schemes would have initiated a new era for the Welsh countryside as the Scottish schemes have done in Scotland.

* * *

It is some time now since I raised the question of the confusion likely to arise from the sharing of the initials " B.E.A." by the British Electricity Authority, the British European Airways Corporation and the British Engineers' Association. Now a correspondent to the *Manchester Guardian* has raised the matter—so far as the first two bodies are concerned. His solution is that *our* B.E.A. should use the initials " B.El.A." and the air line " B.Eu.A." But why can't the latter call itself " B.E.A.C."?

* * *

From the *Daily Telegraph* of 18th November:—

> " Results of the Greek election are more than a crushing defeat for the Communist-inspired E.D.A., which has gone down to extinction."

Nothing is known of this business at 2, Savoy Hill.

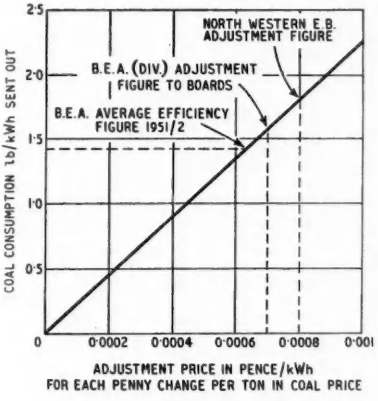
# CORRESPONDENCE

*Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.*

## Coal Clause Revision

THE ever-increasing price of coal has made the coal clause an important item in industrial consumers' electricity accounts. The basis in use is that of coal at 38s a ton but the actual cost of coal is now approaching 60s a ton. As a result of this, the coal clause may account for 10 to 20 per cent of the total bill and it is important, therefore, that it should bear a reasonable relationship to the actual increase in the price of coal to the B.E.A.

The Authority is to be congratulated on the improved efficiency of its power stations and the resultant drop in coal consumption




**Relationship between coal consumption and adjustment price**

per kWh generated. Every such improvement means, however, that the coal clause should carry less weight, and while the basis obviously cannot be revised every few months, I think the time has come when it should be brought under review once more.

The accompanying graph shows the direct relationship which exists between the coal consumption in lb/kWh and the true adjustment figure in decimal parts of a penny for each penny change per ton in the price of coal. The adjustment figure from the Divisions to the Boards is 0·0007d, corresponding to 1·55 lb/kWh. The corresponding figure used by the North Western Electricity Board to industrial consumers is 0·0008d, corresponding to 1·8 lb/kWh.

The 1951–52 B.E.A. figure of average coal consumption is 1·417 lb/kWh, corresponding to 0·00063d. Would it not be possible for the Divisions to reduce their figure to 0·00065d and the Boards to 0·0007d? There must, of course, be a margin between the two figures to cover power losses and overhead charges, but the 8 per cent proposed should be adequate for this purpose.

A further point: Why not modify the tariffs so as to quote a realistic price for coal? The 38s coal has gone for ever. Could we not use 60s as a new basis and sometimes get a rebate instead of an increase under the coal clause?

ROBERT A. HARVEY.

*Prestwich, Manchester.*

## Electric Clocks

THE automatic winding of a spring-driven clock by means of an electric motor is, with a few special exceptions, a retrograde step. For general use it has as many objections as the synchronous clock. The ideal electric clock is one divorced entirely from the mains. A household clock should be capable of being moved anywhere at any time, but this cannot satisfactorily be done if it must be connected to the house wiring.

The solution is a battery driven clock. It is a lamentable failure in modern electrical development that such a clock has not been produced in hundreds of thousands. As long ago as 1906 a nearly perfect battery driven clock was put on the market under patent No. 14614 and named "Eureka." Manufacture ceased at the time of the first world war and the patent has expired. In principle, this clock consisted of a heavy spring controlled balance wheel on ball bearings, containing an electro-magnet

which received an impulse every 2½ sec, taking 10 mA at 1·5 V or less—a single cell. It was capable of keeping perfect time over very long periods with temperature variations ranging from zero to 90 deg F, with the battery down to 1 V, and it needed no critical levelling for reliable operation.

The movements were supplied in all manner of cases. I have had two of them running continuously for 35 years. The outstanding specimen is an office dial in a circular mahogany case 16in in diameter and with a 6in minute hand. A single "U2" cell costing 6d keeps this on time for 12 months or longer. The workmanship put in the original "Eureka" movements would be expensive to produce at the present time but modern magnets and technique should make a cheap version possible.

One strong objection to mains driven clocks of any sort may not be generally realized. Householders, these days, are very safety-minded and many open the main electric switches when leaving their houses unattended. I always do.

B. S. T. WALLACE

*Norbury, S.W.*16.

## Installation Inspection

PRACTICALLY everyone agrees that installation inspection is necessary, and it is universally accepted that in engineering work generally inspection should be carried out by independent and unbiased individuals or organizations. The proposed National Inspection Council fulfils these conditions, but one inspector to each Electricity Area could not deal with any more than a small fraction of the installations in the Area.

It is the legal duty of an electricity supply authority to ensure that an installation is safe before it is connected to a supply system. The way in which this duty is carried out varies in different districts from the simple use of a "Megger" insulation tester to a thorough inspection. Is not the supply authority the best body to be made responsible for a thorough inspection? Its representatives must visit every new installation to connect it and they must visit a house or establishment to re-connect it after it has changed hands.

The fundamental objection to this arrangement is that it is not an independent and unbiased organization. The Boards are actively engaged in electrical installation work and would thus have to inspect their own work and that of their competitors. There are other objections to their being the inspecting bodies, but the fundamental objection and all other objections would disappear if they ceased to carry out electrical contracting work.

They could then be empowered to inspect thoroughly every job, and the cost of doing so would be a fraction of the cost of the proposed N.I.C. The general public would benefit by safer installations and would be spared the cost of the N.I.C., which would be borne indirectly by the public.

There are many other advantages in such a scheme which would take too long to detail here. The political difficulty of putting the scheme into operation is obvious. The supply authorities are authorized by law to engage in electrical contracting. Bad laws have been altered before to-day. Is it not possible for engineers of all political creeds to get together and agree on the best way of dealing with an engineering problem and then give honest technical advice to their parliamentary representatives. The problem should be taken out of the sphere of party politics.

V. R. TURNER, A.M.I.E.E.

*Bexhill-on-Sea.*

## Refinery Electrification

AT a recent meeting of the Scottish Branch of the Institute of Petroleum at Grangemouth an address was given by Mr. F. N. Beaumont, B.Sc., M.I.E.E., of the Anglo-Iranian Oil Co., Ltd., and Mr. G. A. McLennan, of Scottish Oils, Ltd. In this paper a review is made of the basic principles and detailed development of the electrical networks used by the Anglo-Iranian Co. in its refinery developments in Great Britain, the Continent, and the new refineries to be erected in the Middle East and Western Australia. As this standard method of electrification was first developed for the new Grangemouth refinery of Scottish Oils, Ltd., the paper has particular reference to this plant.

In conclusion, the authors suggest some fields of future development, particularly in the application of remote control for motors to be embodied in mimic process diagrams in central control rooms, and point out the economy to be gained by carrying such circuits over telephone cable networks. Such a principle has been developed and applied to the remote stopping of loading pumps in tank farm pumphouses from control points situated at the head of the loading jetties at the new refinery in the Isle of Grain, Kent.

# Electric Cooker Design

## *The Manufacturers' Point of View**

IT is as unusual, as it is stimulating, for a designer to be assailed by a blast of *constructive* criticism. The forthright article by Mr. W. J. L. James in the *Electrical Review* of 17th October under the title "Gas *versus* Electric Cooking" and the correspondence which followed it is a tonic to designers, not least because it shows the keen interest taken in their products.

Most, if not all, the suggestions which have been made for improving electric cookers have been considered by designers from time to time; many of them are, in fact, incorporated in current production cookers (e.g., large hobs, separate grills, large ovens, etc.), while others have had to be rejected on account of technical difficulty or, more usually, cost, and this is probably the main reason why the electric cooker of to-day falls short of the perfection which Mr. James and his supporters seek.

### Cost of Manufacture

The manufacture of electric cookers involves the investment of a large amount of capital. Tool room, machine shop, press shop, foundry, vitreous enamelling shop, polishing, plating and painting shops, plastic moulding and ceramic moulding, assembly conveyor lines and a fleet of delivery vans, represent a big capital investment, and even where a cooker manufacturer does not own the whole lot (e.g., plastic moulding plant) he is still responsible for, and has to pay indirectly for, the value of the plant which his demands occupy. To remain solvent he must use his plant economically and this means achieving the maximum output of which it is capable.

Electric cookers must, therefore, be designed to sell in the greatest quantity possible. To achieve this, the design must be acceptable to all potential purchasers and the price must be competitive. A cooker having a waist high oven and a large hob may be very desirable to the user, but its overall dimensions are too great for it to be accepted in about half the kitchens in this country, which is the main reason why designers have favoured the vertical type of cooker.

From a cost point of view, the gas cooker which has approximately equivalent cooking capacity to the normal three-plate electric cooker sells at a price of about £20, has four boiling rings, a separate grill and a large oven, whereas the average cost of a three-plate electric cooker is about £30. There are two principal reasons for this difference.

In the first place the electric cooker is inherently more expensive than a gas cooker because, for example, the cost of a boiling plate and switch is much higher than that of a gas ring and tap. The second reason for the difference in cost is the difference in the quantities produced. As an example, one of the gas cookers of the type mentioned above is produced in quantities of 3,500 to 4,000 per week from one factory, all to the same specification. An electric cooker manufacturer who produces perhaps 1,000 cookers per week finds that they are not all of the same type, but of ten or more different specifications: Some customers require legs, while others prefer a plinth; some require grey mottle while others want cream or white enamel; some have radiant boiling plates, others solid; some prefer a simmering device, others a three-heat switch, and so on. Such small-scale production of so many variants substantially increases the manufacturing cost.

### Importance of Price

The great majority of cooker users are not connoisseurs; they select the cheapest model which will cook effectively and reliably and if, perchance, they have some preference for electricity, they cannot afford to indulge it if its initial cost is much more than gas. There is already on the British market a modern cooker which incorporates the majority of the features which have been mentioned in Mr. James's article and recent correspondence—large

* This article has been prepared by the design staff of a prominent electric cooker manufacturer.

oven, separate grill, large hob, illuminated oven interior and so on. Because of its size, the cost of material and manufacture of this cooker is high and as a result its selling price is too high for most people. If it were not for export sales, cookers of this type would not be seen at all on the British market.

Because of adverse propaganda, to which the use of electricity domestically has been subject for some years, the ratio of gas to electric cookers being installed is about six to one in favour of gas. The resultant uneconomic quantities on which electric cooker manufacturers now have to operate only serves to widen still further the difference in manufacturing costs, since it is only by full use of manufacturing facilities that a low economic cost can be achieved.

Thus the only course open to the designer of electric cookers is to achieve the simplest and most economic design which he can, cutting out expensive non-essential features. For example, on a cooker which is to have both boiling and grilling facilities the use of a grill-boiler will save the cost of a separate grill and its control switch—a considerable item.

The bigger the cooker the more it costs. A large hob means a large cooker, because the idea of allowing the hob to project beyond the sides of the body of the cooker is unacceptable where it is placed side by side with other kitchen furniture of cabinet construction. If the designer increases the width of the cooker from, say, the standard 21in to 24in, the retail price is increased by about £3. As the electric cooker already costs nearly 50 per cent more than the equivalent gas cooker, such an addition is quite unacceptable.

## Boiling Plates

In order to minimize the cost of servicing and maintenance the engineers of the Electricity Boards insist upon boiling plates conforming to the E.D.A. interchangeability specification. This fixes, among other things, the dimension between the connector pins and the centre of the plate. Since the socket which takes the connector pins is most economically placed in the wiring chamber which surrounds the grill chamber, the position of the plate relative to the edge of the hob, either front or sides, is automatically fixed, and that is why boiling plates are generally either too near the back or the sides of the hob.

The designer setting off on a new cooker project finds himself surrounded with cost limitations due to small kitchens, the interchangeability specification, and so on. He is obliged to use the grill-boiler to save money and this inevitably fixes much of the rest of the design of the cooker. The grill-boiler needs access both to the hob and to the grill chamber, which prevents the introduction of a removable crown plate between these two parts of the cooker, whereas if a separate grill were used, it could be mounted beneath the removable crown plate. A grill-boiler also prevents the switches being mounted in a horizontal line immediately below the hob because the grill-boiler has to be placed with its front edge close to the front of the grill chamber for easy access.

## Sizes of Hob and Oven

The size of the hob is fixed by considerations of cost as explained above. Of the requirements of B.S. 1195—Kitchen Fitments and Equipment—which recommends the dimensions to which such equipment should be built, only the height of the hob of 36in and the front-to-back depth are of real importance in fitting a cooker into a modern kitchen. The width is not critical since there is no standardization of the length of kitchen walls.

Cookers are on the market now with ovens varying in size from less than 2,000 to about 3,600 cu in capacity. For economy both in initial cost and in electricity consumption, the designer favours the smallest oven that will effectively do the job. A small oven is not only cheaper to make and use, it is also easier to heat with uniform temperature distribution; it is also easier to obtain good thermostatic control in the smaller oven. The average three-plate cooker has an oven capacity of about 2,500 to 2,750 cu in and in such an oven may be cooked at one time the following representative loads of food: – 10–12 lb bread; or a 20–25 lb turkey with potatoes and a flat dish such as a plate pie, mince tart, etc.; or an average size joint – say 4–6 lb with 3 lb roast potatoes, a Yorkshire pudding and three or four 1 lb cakes or their equivalent.

Although these ovens appear small by the side of a gas cooker in which so much space is wasted to permit the circulation of burnt gases, they are, in fact, of adequate size for normal cooking duty and to make

them bigger would increase the consumption of electricity and the cost of manufacture.

All design is a compromise, and the designer must strike a balance between cost and the provision of desirable facilities; between what can be produced and what may be desired; between initial performance and maintenance costs.

The interior of an oven has to withstand severe thermal shocks without crazing of the enamel. If titanium steel were readily available, a single coat of white titanium enamel would give both the light colour which some prefer and resistance to thermal shock. But in the absence of this material (which is, as yet, only available in the United States) the necessary durability can only be obtained by using a dark coloured ground coat of enamel spattered with white flecks to lighten its appearance. Of course, not all users favour a colour so light that it throws into prominence every burnt grease mark in the oven.

Mention has been made of the speed of the gas boiling ring compared with the electric boiling plate and the combination of a gas hob with an electric oven and grill, as found in other countries, has been proposed. In boiling small quantities from cold the gas ring has the advantage; it may save as much as three or four minutes in boiling a pint of milk if the gas pressure is good. But although gas may be a useful form of energy for some industrial heating jobs, it has no place in the kitchen where its products of combustion foul the air; its waste heat makes the kitchen unbearably hot in the summer and it blackens the bottom of the pans used on it. To regular users, the speed of the electric boiling plate usually gives no cause for complaint; it takes longer to peel the potatoes than to heat the water to boil them; the milk for the custard heats quickly on a plate already hot from an earlier duty, and so on.

There is no complacency, however, among designers regarding the performance of boiling plates and much work has been done, and is continuing, to improve it. To raise the loading of the plate would help, of course, but very highly loaded plates do not have a long life when subject to the misuse some frequently have to withstand. In a cooker, durability is an essential feature.

The majority of cookers on sale to-day are not of very recent design. The range of cabinet cookers introduced after the war is now six or seven years old in design, from which point of view the time is ripe for some new introductions. The testing and development of worth-while features to improve cooker design takes time and the cost of tooling new models is heavy, necessitating careful consideration of the potential market. But Mr. James may be assured that behind the scenes work is going on to improve and perfect new designs, to be launched in the not-too-distant future, which will set the electric cooker once again as far ahead of its gas competitor as it was in 1935.

## Power Engineers' Salaries

AT a meeting of the National Joint Board (Electricity Supply Industry) on 18th November it was decided that as from 1st August last the revised schedules of salaries annexed to the National Joint Board agreement of 17th February, 1950, should be amended as follows:—

*(a) Schedule "A" and Classes "BX" to "FX" of Schedule "C."*—The salary figures appearing in the column headed "For 2 years" in each class to be adjusted as follows: (i) Salary figures of up to £400 per annum to be increased by £15 p.a.; (ii) Salary figures of £401 to £700 to be increased by £20 p.a.; (iii) Salary figures of £701 and over to be increased by £25 p.a.; (iv) Salary figures appearing in the remaining two columns in each class to be adjusted to give proportionate progression to the first column figure applicable to the same grade in the next class.

*(b) Schedule "D" and Class "AX" of Schedule "C."*—The minimum and maximum salary figures to be adjusted as follows: (i) Salary figures of up to £400 p.a. to be increased by £15 p.a.; (ii) Salary figures of £401 to £700 to be increased by £20 p.a.; (iii) Salary figures of £701 p.a. and over to be increased by £25 p.a. The salary figures appearing in the intervening incremental columns to be adjusted to give proportionate progression between the minimum and maximum salary figures of the individual grades in Schedule "D" and Class "AX" of Schedule "C."

Where a difference arises in regard to the application of these provisions to an employee in receipt of a personal allowance or other excess payment, it is to be referred to the appropriate District Joint Board for determination. Pending consideration by the N.J.B./N.J.C. Co-ordinating Committee, the adjustments will not increase an employee's entitlement under Clause 12 (*a*), Part 4 (Holidays) of the N.J.B. Agreement, nor under the provisions governing subsistence and other allowances.

# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

AS has already been reported, **Mr. J. F. Wallace,** the general secretary of the Electrical Power Engineers' Association, is retiring at the end of the year. The seven Divisional Councils of the Association have been asked for nominations for a successor to Mr. Wallace and six of them have put forward the name of the deputy general secretary, **Mr. H. Norton**; the Irish Division failed to send in a nomination. It has been agreed that a ballot is unnecessary and that the National Executive Council can proceed to make the appointment at its meeting this week-end.

**Mr. J. N. Aldington,** B.Sc., Ph.D., director of research at Siemens Research Laboratories, Preston, Lancs, has been appointed managing director of Siemens Electric Lamps & Supplies, Ltd., with **Mr. H. E. Humphries,** M.B.E., managing director of Siemens Brothers & Co., Ltd., as chairman. Dr. Aldington, who has been with the company for over thirty years and joined the board in 1948, is a past president of the Illuminating Engineering Society and his many important contributions to technical publications in this country and his lectures covering every aspect of the lighting field are well known.

**Mr. C. J. N. Borg,** general manager, **Mr. C. A. Hughes,** A.M.I.E.E., sales manager and **Mr. P. D. Oakley,** B.Sc., manager of the Preston lamp factories have also joined the board of Siemens Electric Lamps & Supplies, Ltd. Mr. Borg joined the company in 1934 as assistant secretary, becoming secretary and later general manager on the retirement of Mr. S. H. Callow. Mr. Hughes entered Siemens' service in 1910, becoming manager of the Lamp Department in 1924 and being appointed sales manager in 1940. He was chairman of E.L.M.A. in 1949-50 and 1950-51. Mr. Oakley has been with the company since 1915 moving from Dalston in 1923 with the transference of the lamp works to Preston, where he has since remained, taking charge of the lamp factories there in 1939.

Siemens Brothers & Co., Ltd., announce that **Mr. W. G. Patterson,** who has been with the company for thirty-five years, has joined the board of directors and has been appointed deputy managing director.

Mr. W. G. Patterson

**Sir William Robinson,** J.P., is resigning from the chairmanship of the Northern Ireland Electricity Board, owing to pressure of business, and he will be succeeded on 1st January by **Mr. James Walker,** F.C.A. Sir William, who is managing director of Robertson, Ladlie, Ferguson & Co., Ltd., Belfast, has been chairman of the Electricity Board since 1944.

**Mr. Raymond J. Hurley,** chairman of the Thor Corporation, Chicago, is at present on a visit to this country to study marketing conditions here, and last week a cocktail party was held at the London offices and showrooms of Thor Appliances, Ltd., the British concern, to enable Mr. Hurley to meet Thor dealers in this country. Mr. Hurley, who has just completed a tour of Europe, made some interesting observations on conditions on the Continent, and he told us that he was much impressed by the great efforts being made by the German electrical industry to regain its

Dr. J. N. Aldington

Mr. C. J. N. Borg

Mr. C. A. Hughes

Mr. P. D Oakley

pre-war position in world markets. The equipment he had seen was good and Germany was fast becoming a serious competitor. Speaking of his impressions of the domestic appliance market in this country, he said that he felt there was an eagerness on the part of domestic consumers to buy electrical appliances.

**Mr. R. H. Lancaster** has resigned from Nash-Kelvinator, Ltd., to accept a position on the board of its London distributors, Coldstor, Ltd., and subsidiary, Self-Service Refrigeration, Ltd. He will commence his new duties as sales director of Coldstor, Ltd., on 1st December.

A dinner was recently given in the L.D.C. Hall at Willesden of **Lancashire Dynamo & Crypto, Ltd.**, by the management to more than sixty long-service employees and their friends. Mr. D. C. Lorkin, joint managing director, presided. Among those with over forty years' service was Mr. J. G. Shaw, a joint founder with his brother, Mr. C. R. Shaw, of the original Crypto Electrical Co.

**Mr. J. R. Tole** has been appointed manager of the British Thomson-Houston Co.'s engineering drawing offices in the Rugby and the Coventry Works organizations. After an apprenticeship with the B.T.H. Co., Mr. Tole became a draughtsman and then worked on the mechanical design of electric machines. He was appointed as assistant manager, drawing offices, and drawing office engineer in 1951. He succeeds **Mr. P. E. Warden**, who is retiring after fifty years' service with the company. Mr. Warden joined the company as an apprentice in 1902, being appointed assistant manager, drawing offices, in 1938, and manager in 1945.

Mr. J. R. Tole

The Dramatics Group of the **J. & P. Sports and Social Club** started its 1952-53 season with three performances of Stafford Dickens' "Lady—Be Careful" on 13th, 14th and 15th November. The play was performed in the Club's Hall at Charlton before large audiences which included Mr. R. W. C. Reeves, a director of Johnson & Phillips, Ltd., and members of the staff of the Telegraph Construction & Maintenance Co., Ltd.

There were over 300 guests at the annual ball of the Northern Counties Area of the **Electrical Industries Benevolent Association**, held at the Old Assembly Rooms, Newcastle-on-Tyne, on 19th November. Mr. J. C. Arkless, area chairman, with Mrs. Arkless, received the guests, and were supported by Mr. W. R. Gledson, incoming chairman, and Mrs. Gledson. The gathering included many well-known electrical men. At the dinner which preceded the dance Mr. Arkless proposed the toast of the Association. The organizing committee for the ball were Mr. A Parkin, Mr. R. H. Davison, Mr. F. C. Barford, Col. G. G. Mallinson and Mr. C. Gray.

**Mr. W. R. Gledson (left) and Mrs. Gledson with Mr. and Mrs. J. C. Arkless at the annual ball of the E.I.B.A. Northern Counties Area**

**Miss E. C. Bradshaw** has retired from the General Electric Co., Ltd., after forty years' service. She started her career with the company as shorthand typist to the late Mr. Wynne Roberts, and three years later was appointed secretary to the late Lord Hirst, a position which she retained until Lord Hirst's death in 1943. She then became secretary to Mr. H. C. Wilson, secretary of the G.E.C. Pension Fund.

**Mr. H. G. Carter,** A.C.A., secretary of Lancashire Dynamo Holdings, Ltd., has been appointed to the board of the company.

**Dr. C. F. Bareford,** head of the Mullard research laboratories in Surrey, has been appointed chief superintendent of the Long Range Weapons Establishment at Salisbury and Woomera, South Australia. He will succeed **Mr. H. C. Pritchard,** who is returning to the British Ministry of Supply next year after more than three years' distinguished service in Australia. Dr. Bareford will spend a period in England to familiarize himself with the various forms of guided weapons that will be sent to the range in Australia for trials.

Proposing the toast of the Association at the annual dinner of the Huddersfield Branch of the **Electrical Contractors' Association,** Mr. D. Bellamy, chairman of the Yorkshire Electricity Board, said that there had been

attacks on the efficiency of power stations, but the attackers should think up to the point of use, for he contended that electricity was the most efficient form of light, heat and power. And it was produced from what is, relatively speaking, coal rubbish which could not be used elsewhere. Replying to the toast, Mr. J. R. Halliwell, a vice-president of the E.C.A., said that private traders were under the handicap of not being able to obtain the necessary finance for undertaking hire-purchase and they regarded it as unfair that Area Boards should be able to allocate so much of their resources to it. The toast of "The Town and Trade of Huddersfield" was proposed by the Branch chairman, Mr. A. Drummond, and Coun. G. B. Jones replied. "Our Guests" was proposed by Mr. J. T. Thornton and responded to by Mr. H. V. Crabtree, president, Huddersfield Textile Society.

On 14th November the London Students' Section of the **Institution of Electrical Engineers** held its annual winter dance at Victoria Halls, Bloomsbury Square. About 230 people spent a happy and informal time dancing to the music of Peter Wakelin and his band, and the success of the evening was in no small measure due to the master of ceremonies Mr. A. R. Telford.

## OBITUARY

**Mr. S. R. Roget.**—We regret to report that Mr. Samuel Romilly Roget collapsed in his office at the British Standards Institution on 17th November, and died in hospital shortly afterwards. Mr. Roget was the grandson of Dr. P. M. Roget, the author of the famous "Thesaurus" and he had for many years kept the work up-to-date. At the time of his death he was working on the preparation of British Standard vocabularies in a number of technical fields.

Mr. Roget joined the B.S.I. staff in 1941 to take charge of the revision of B.S.205—"Glossary of Terms used in Electrical Engineering," and when that task was completed in 1943 he agreed to take charge of similar work in other fields. He was engaged in the revision of the International Electrotechnical Vocabulary which is in preparation by the International Electrotechnical Commission. He acted as secretary to thirty-one committees and for a man of his age, seventy-seven years, he displayed a remarkable agility of mind. He had for many years been secretary of the Huguenot Society and had recently become president. He leaves a son and a daughter.

**Major G. K. Field.**—The death occurred on 19th November at the age of sixty-nine of Major George Kenelm Field, F.R.S.A., a well-known engineer in both military and civilian life. Major Field received his training at the Chelmsford works of Crompton & Co., and joined Col. R. E. Crompton as chief technical assistant. He designed the now universally adopted British standard fine thread, and other designs by him included a heavy duty steam tractor. During the 1914-18 war he assisted in the design of a military tank, and he also had charge of the inspection of rotary engines with the Aeronautical Inspection Department of the R.F.C. Later, as a civilian, he formed his own engineering concern and in collaboration with the Western Electric Co., Ltd., he assisted in the installation of the first motion picture sound equipment in London. During the last war he was engaged by the Admiralty on the design and inspection of radar equipment.

**Mr. Samuel Martin,** A.M.I.Mech.E., chief draughtsman and drawing office manager of Mirrlees, Bickerton & Day, Ltd., died on 15th November at the age of sixty-one. In May this year he completed forty years' service with the company. Mr. Martin entered the service of Mirrlees, Bickerton & Day, Ltd., in 1912 as a junior draughtsman, engaged on engine design and contracts work. During the 1914-18 war he was one of a team working on the Mirrlees-Ricardo engines for tanks and was responsible for much of the administration during the adoption of the then high-speed type engines for the Admiralty. He was appointed chief draughtsman and drawing office manager under the chief engineer in 1945.

**Mr. Thomas T. Cameron,** A.M.I.E.E., senior assistant (operation and maintenance), South West Scotland Electricity Board, died on 18th November at the age of fifty-four. Mr. Cameron entered the service of the former Glasgow Corporation Electricity Department in 1925 and in 1929 he transferred to the service of the former Clyde Valley Electrical Power Co. as assistant district engineer. He was appointed area engineer of Yoker East Area in 1934, a position which he held until his appointment to the staff of the chief engineer.

**Mr. John Hall.**—The death has occurred at Burton-on-Trent, at the age of sixty-nine, of Mr. John Hall, who established the electrical and mechanical engineering firm of John F. Hall, Ltd.

## WILLS

**Captain H. G. Merrick,** M.C., A.M.I.E.E., formerly general manager of the Llanelly and Gorseinon Electric Supply Companies and of the Carmarthen Bay Power Co., who died on 12th August, left £2,272 gross (£1,472 net).

**Mr. J. S. Niven,** director and secretary of James Howden & Co., Ltd., who died on 25th May, left personal estate in England and Scotland valued at £19,859.

**Mr. D. R. G. Mason,** A.M.I.E.E., Aberdare and Mountain Ash district engineer of the South Wales Electricity Board, who died on 7th July, left £3,500 gross (£3,457 net).

# Engineering in Europe

*Survey of Current Literature*

A NEW method, based on the use of an a.c. network analyser, permits not only problems occurring in large power systems and transmission lines to be solved with comparative ease and speed, but also some connected with electrical machinery the solution of which seemed hitherto almost impossible. Mathematically all these problems amount to the solution of involved systems of ordinary differential equations with constant coefficients, as well as of equations with variable coefficients and of partial differential equations.

One of the methods is reduction of the transient problem to the corresponding steady-state problem, or the "periodization" of the aperiodic phenomenon by mathematical representation by functions "continuous by sections" which can be paralleled by devising appropriate equivalent circuits capable of being modelled in a network analyser. Even in this simplified case the determination of the coefficients requires the solution of complicated systems of algebraic equations but, fortunately, the network analyser itself is also useful for performing this preliminary operation.

Nevertheless some additional apparatus, such as harmonic analysers and synthesisers, will greatly widen the range of problems which can be conveniently and rapidly solved. Of these problems, circuits with periodically varying parameters form one special class, transient phenomena in salient-pole machinery another and systems with distributed constants a third class. The treatments of the various classes are obviously somewhat different, though they are essentially variants of the same basic method.—"Engineering Methods of Calculating Transient Processes in Large Power Systems," E. A. Meerovich and V. A. Taft, *Elektrichestvo*, No. 8, pp. 31–38, 1952, in Russian.

## Expansion Circuit-Breakers

The problem of designing safe and simple circuit-breakers for indoor-operation seems to have been solved successfully by the introduction of the expansion type of breaker which uses water as a quenching medium, but may also be operated with special quenching liquids, e.g., with "expansion." This type of breaker is said to be suitable for up to 35 kV and for breaking capacities up to 200 MVA. A particular advantage is the absence of carbon from the quenching medium, while the favourable quenching characteristics of hydrogen are still utilized; also when circuit-making the low conductivity of distilled water assures soot-free switch operation, i.e., absence of the current peak due to the magnetizing current, which reduces the stresses in the windings of transformers, motors, etc.—"Expansion-Type Circuit-Breakers in H.V. Plants," A. Hoh, *Deutsche Elektrotechnik*, Vol. 6, No. 7, pp. 322–324, July, 1952, in German.

## Stability of Rural Lines

The starting of the conventional types of squirrel-cage motor used for agricultural purposes may upset the supply system stability by the magnitude of the braking and pull-out torques of the motors, unless the generator is provided with automatic field control. The characteristic phenomenon in such cases is a voltage surge ("avalanche"). It is thus clear that rural power systems must be carefully designed in this respect and the theoretical results verified by measurements and tests. Unfortunately, accurate calculations, even close approximations, are extremely difficult and laborious for comparatively simple systems owing to the transient character of the phenomena.

The author succeeds in proving that it is only a question of the correct choice of permissible simplifications and equivalent circuits that renders the problem susceptible to solution with an accuracy confirmed by the results of calculations carried out on a network analyser and also by direct measurements. Among these results the following are of general interest: stable operation of 8–10 electrotractors may be obtained with a system of 500–700 kVA rating (if the average power requirement of a tractor

is 40 kW); alternatively, systems supplying agricultural machinery of an average demand of 20 kW/unit need not exceed aggregate ratings of 200–300 kW for stable operation.—"Stability of Rural Power Systems in Normal Conditions of Operation," M. S. Levin, *Elektrichestvo* No. 8, pp. 39–44, 1952, in Russian.

## New Metal Detector

Metal detectors are used for various purposes and may be based on various physical principles, although the only appropriate one seems to be that using a search coil connected in an oscillation circuit whose amplitude and frequency are altered by metal particles brought into the field of the coil. An interesting fact is that the frequency ranges to be used vary widely with the particular metal searched for. The article is more particularly concerned with a set-up for checking persons, without actually searching them, leaving places where noble metals are kept or worked. The instrument consists of a valve generator and a pentode amplifier with potentiometer in a bridge-circuit well known in valve voltmeters. The bridge diagonal contains a thyratron whose grid has a slight negative bias when the bridge is balanced. Unbalancing the bridge makes the thyratron grid positive; it will fire and act as a relaxation oscillator, setting up a saw-tooth oscillation which, through a relay, operates an alarm. The sensitivity of the circuit may be varied with the aid of a moving-coil galvanometer in the grid circuit of the thyratron. The high sensitivity of the instrument requires absolute constancy of all the supply voltages, which is obtained by the use of a magnetic voltage stabilizer. A somewhat simplified variant of the detector described is used with advantage for searching for stray metal parts on conveyors used in various industries.—"A New Metal Detector," W. Zandra, *Elektrotech. Zeitschr.* (A), Vol. 73, No. 15, pp. 487–489, 1st August, 1952, in German.

## Power Line "Sleet Jump"

The influence of quiescent ice and snow loads on overhead power line conductors, often dealt with in the literature, was recently analysed comprehensively by this author (A.S.E. *Bulletin*, No. 14, 12th July, 1952) who also contributed a new graphical method of determination. Of particular interest are the conductor vibrations consequent upon the dropping of the ice loads, which is the form of movement by which the relieved conductor finds its new equilibrium position. The tensioned conductor acts as a powerful spring, loaded with inert mass, thereby constituting an oscillating system left to itself with an initial deflection from the equilibrium position impressed upon it.

Knowledge of the peak amplitude of the oscillations (which are the damped natural oscillations of the conductor) is important, mainly when conductors are erected in the same vertical plane, because the sleet jump in the absence of wind occurs in a vertical plane. However, as often as not, the dropping of the ice load may be due to wind and then the conductor moves in the resultant direction of its oscillating movement and the wind, in which case even offset neighbouring conductors may be hit and an outage ensue. Although the height of the sleet jump may be calculated from the energy theorem (constancy of sum of elastic, potential and kinetic energies) such calculations are awkward and laborious.

The author's graphical method is definitely a simplification and saves time; experiments confirm the correctness of the results so obtained. Unfortunately, it is a technical impossibility to increase conductor spacings so much as to exclude with absolute certainty cases of one conductor hitting another.—"The Height of the 'Sleet Jump' of Overhead Line Conductors after the Dropping of Ice Loads," K. Lips, A.S.E. *Bulletin*, Vol. 43, No. 15, pp. 621–626, 26th July, 1952, in German.

[Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates. —Editors, *Electrical Review*.]

## Taiwan Development

THE Tien Lun power plant was recently inaugurated in central Taiwan (Formosa) when the first of its three generators was put into operation. Each of the generators has a capacity of 26,500 kW. With the addition of the new generator, the total power supply in Taiwan is now 330,000 kW. The 82-mile Taehia River at Taichun provides the water power for the plant. The second generator is scheduled to be ready by next spring. The construction of this new plant is part of a five-year expansion plan launched by the Taiwan Power Company in connection with Taiwan's industrialization programme. The plan aims to increase the plant capacity by 300,750 kW.

# PARLIAMENTARY NEWS

*From Our Special Reporter*

IN the House of Lords last week Lord MacDonald of Gwaenysgor called attention to the report of the Committee on the National Policy for the use of Fuel and Power Resources. (See *Electrical Review*, 12th and 19th September.)

Lord Ridley (chairman of the Committee) referred to the recommendations made, and said that the Committee had no intention at all that the Joint Planning Board which it had recommended should in any way interfere with the normal development of the fuel and power industries as they were at the present time. The Committee envisaged that there might be many problems in respect of which actual joint production proposals would in future be found advantageous, for instance, a possible combined operation of gas and electricity. It was felt that the Joint Planning Board would be of use in solving those problems.

## Promotional Tariffs

The proposed Tariff Advisory Committee was to be purely advisory to the Minister. The Committee found what looked like conditions of tariffs, particularly in electricity supply, which did not seem to reflect the real cost to the consumer. It had been said that electricity tariffs were promotional, and, of course, the use of more electricity made it cheaper. That was probably all to the good. But it seemed to the Committee that that policy tended to encourage the sale of electricity at peak times when electricity cost more than the price paid for it because it required a great deal more generating capacity and involved the use of older, less-efficient plant. The Committee thought it important to try to find some means of applying tariffs which would relate the price paid for electricity to the conditions under which it was produced at the time it was used. The Committee was not, in principle, against any tariff that was promotional. The history of the electricity industry showed that promotional tariffs had not only increased sales very largely but had also improved the load factor considerably.

Lord Leathers, Secretary of State for the Co-ordination of Transport, Fuel and Power, after paying a tribute to the work of the Committee, reminded the House of the conditions with which the country was faced in the early months of 1951 when the Federation of British Industries and the Trades Union Congress jointly urged the late Government to set up an independent committee to go into this subject. Although the situation had since improved, it would of course be wrong to think that the problem of a fuel and power shortage had now disappeared. A severe winter might well put a very serious strain on our coal supplies, and we still might be faced with interruptions in industry as a result of a shortage of electric power during peak hours. Quite apart from that there was an overwhelming case for making the very best use of the country's resources.

His Lordship reviewed the endeavours being made to encourage the use of more efficient solid fuel heating appliances. On the industrial side the Government warmly supported the view that industry should take greater responsibility for improving its fuel efficiency and would do the utmost to foster a scheme on the lines proposed by the Committee.

## Railway Motive Power

There was a strong case for replacing at least some of the railway steam engines by other forms of motive power—either electric or diesel or, possibly, in the future, gas turbines. But a change-over of this sort on any substantial scale involved a huge capital investment, and even if it were agreed to be desirable it would be quite unrealistic to picture any quick results. The British Transport Commission was closely examining the relevant passages of this report.

One recommendation in the Report which the Government did not feel prepared to accept was that heating methods and installations in new industrial and commercial buildings should be subject to planning control.

The main group of recommendations in the report concerned fuel tariffs. The Committee strongly advocated, in the interests of efficiency and in order to give the consumer what he wanted, that freedom of choice should be maintained between the alternative fuels. But it qualified this by insisting that the prices for the alternatives should be right—that was, closely related to the corresponding costs.

The Committee had recommended that electricity tariffs should discriminate between use at the hours of peak demand and at other times and that extensive practical trials should be made of the various methods of measuring or controlling electricity consumption at peak hours. The Government could readily accept these recommendations in principle but they raised a number of technical and practical problems. Already the charges made by Electricity Boards for industry and large commercial consumers included in some cases provision for lower charges during night hours. One Board was offering specially low night rates to domestic

consumers for electrical apparatus controlled by a time switch. But there would be considerable difficulties about introducing this practice on a widespread scale, particularly for domestic consumers. When one came to consider the demands upon the economy in the shape of steel, manufacturing capacity and labour which would be involved in any wholesale change-over of meters or installation of time switches one could form some idea of the magnitude of this problem. Nevertheless, officials of the Electricity Boards and of the Ministry of Fuel and Power had been examining methods of controlling peak hour demand and they intended to discuss these matters fully with the British Electricity Authority.

The British Electricity Authority was being asked to reconsider commercial tariffs in the light of the Committee's recommendation that the maximum demand charge should be based on the maximum demand as measured each month rather than for each year.

Referring to the decision of the Electricity Boards to suspend indefinitely restrictive conditions embodied in a number of old contracts between Electricity Boards and industrial consumers who required occasional or "stand by" supplies of electricity to augment supplies from private plant, His Lordship said that the Committee had also recommended that tariffs for "stand by" and similar supplies of electricity should directly reflect the costs of administration involved and of connecting and supplying the consumer. That seemed eminently reasonable and the Minister was discussing its implementation with the B.E.A.

The Committee saw the need for certain steps in the direction of greater co-ordination of the fuel and power industries. The Government accepted its views, but was not satisfied that the Joint Planning Board by which the Committee sought to improve co-ordination was either necessary or desirable. The Government believed that more effective co-ordination would be achieved by frequent and regular meetings between the chairmen of the national Boards and the Minister himself.

Lord Falmouth, speaking of railway electrification, said that it would be found that the efficiency of the electric locomotive would be from 17 to 18 per cent, as compared with the 5 to 8 per cent of the steam locomotive. He spoke of the value of the diesel-electric locomotive.

Lord Wolverton, speaking as a former director of an electricity supply company, said he was extremely glad that there was not going to be any direction against freedom of choice of the use of gas or electricity. The nation must push along with all possible speed with the installation of generating stations.

Lord Selkirk, replying for the Government, said that in the supply of electric power we had advanced at roughly the same speed as industry could take it up. It was absolutely vital to this country that adequate power should be available, because it was on that that our exports and life must depend.

## Electricity Poles

Commander Maitland asked the Secretary for Overseas Trade, as representing the Chancellor of the Duchy of Lancaster, if he was aware that the price of a 30ft medium pole suitable for electricity supply had risen in price from £6 5s in July, 1951, to £10 6s delivered on site at the present time; and, as this rise in cost was prejudicing the extension of electricity supplies in country districts, what steps he was taking to get this price lowered.

Mr. Mackeson said that the Chancellor of the Duchy did not control the price of poles. Owing to the time required for selection and treatment the price of poles now being supplied was related to that paid for softwood about a year ago. A fall in the price of poles could be expected in due course, corresponding to the reduction in timber prices in 1952.

## Electricity in Scotland

Mr. Rankin asked the Secretary of State for Scotland when he expected to be able to announce the results of the Government's examination into the question of the supply of electricity in Scotland.

Mr. Stuart said that the examination was being pressed forward but he could not yet say when it would be complete.

## Loan Charges

Mr. Palmer asked the Minister of Fuel and Power what extra financial charges had been imposed since October, 1951, on the British Electricity Authority and the Electricity Boards by the higher rates of interest on loans. Mr. Geoffrey Lloyd said that total interest payments in the year ended 30th September last were £22 million, compared with £18 million for the previous twelve months. The increase was due mainly to additional capital raised by the industry, but partly to changes in interest rates. Any allocation between these two factors could only be hypothetical.

## Bankside Power Station

Answering questions by Sir Edward Keeling, Mr. Geoffrey Lloyd said that the Bankside power station was not yet in commission. The station was expected to consume about 40,000 tons of fuel oil annually, containing about 1,600 tons of sulphur which would form some 3,200 tons of oxides on combustion. About 5 per cent would be discharged into the atmosphere. He could not give an unqualified undertaking that the sulphur dioxide would not do any harm to St. Paul's Cathedral, but the Fuel Research Station, the B.E.A. and the Cathedral authorities were using special instruments to measure the amount discharged.

# Vertical Rising Mains

## *New System in London Buildings*

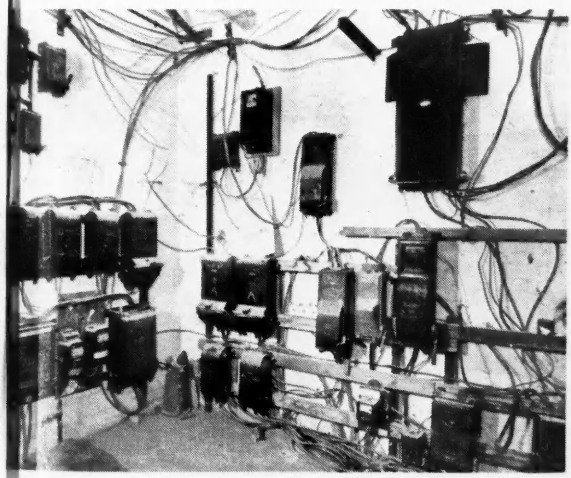
MANY London office buildings are handicapped by antique electrical installations. An example of this was provided by Union and Armour House, St. Martins-le-Grand, E.C.1. This building was originally served by a three-wire 400 V d.c. main with three separate single-phase supplies as well as an independent three-phase supply; armoured cables existed all over the building in large numbers. Until 1949 the building was mainly private offices but extensions had to be made to the installation, as much of the accommodation was wanted by the Post Office for use as an extension to its teleprinter training establishment.

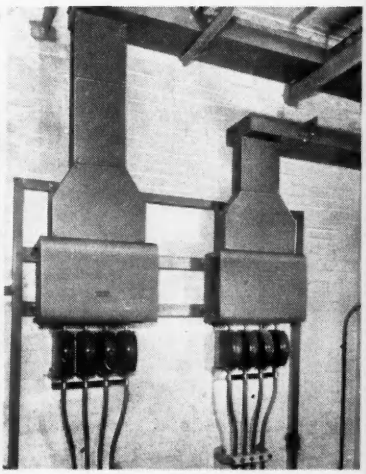
Owing to the nature of the power requirements necessary to maintain an efficient supply to both the Post Office and private firms renting offices, it was realized that if further armoured cable runs were made it would be impossible to maintain a trouble-free service. Furthermore, as the teleprinter training establishment was to be developed it had to be possible for the floor-to-floor distribution of the load to be constantly varied.

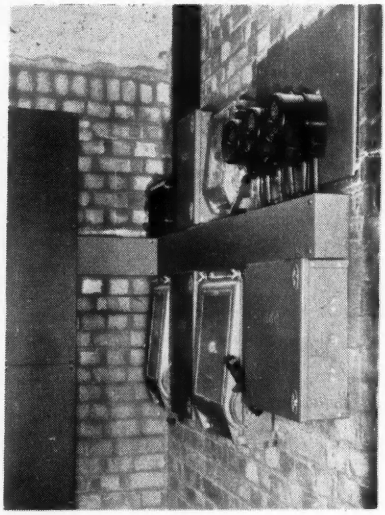
It was decided to use a totally enclosed vertical rising main system made by the G.E.C. and this has now been installed by Haines & Sheppard, Ltd. It comprises two risers, one in Armour House, the other in Union House. Each riser, although following a different route through the building, has been arranged for direct connection to the outgoing side of its corresponding 300 A line contact circuit breaker, thus providing the building with a complete and totally steel enclosed copper busbar rising main, from the point of commencement to the top termination.

Essentially the rising main comprises vertical copper bars mounted in porcelain insulators, the whole being enclosed in sheet steel ducting with removable covers. In this instance the copper bars commence

*Left:* **Part of the original switchgear in the basement showing permanent and temporary wiring.**
*Right:* **The bottom end of the rising main installation showing the method of feeding and switching twin rising mains**







**Assembly of switches and meters at the termination of the rising mains**

at the outgoing side of the main switch with a direct connection and rise to the full height of the building. The conductors will carry 300 A per phase and this capacity is available throughout the entire riser. This enables individual loadings to be changed quickly from floor to floor without causing inconvenience to consumers.

Another feature of the system is that the riser can be installed in stages to coincide with the erection of the building so that tenants occupying the lower floors can be supplied with power before the building is completed. In the case of this installation the initial risers were completed up to the fifth floor and later lengthened when the sixth floor was completed, to provide power for the lifts.

The risers have cross sections of 1in by ¼in for the phase bars and 1in by ⅜in for the neutral, the weights being 0·9 lb per ft and 0·7 lb per ft, respectively, and as the vertical sections of the risers are about 80ft, the weight of copper involved is considerable. It is usual to compensate for copper expansion and contraction in busbar trunking by connecting bar to bar but, with vertical bars, as in this installation, each weighing about 80 lb, it is necessary to provide a further method of compensation. At the bottom of each riser a set of thrust blocks clamps the bars in position and relieves any strain on the intermediate insulators, and the suspension unit is built into the final section at the top termination of the riser. This self-adjusting expansion unit not only supports each individual length of copper bar but compensates for any normal expansion or contraction.

Fire resisting barriers of "Siluminite" have been introduced into the rising duct at each floor level through which the riser passes. In such an installation as this, where the floor to ceiling height is more than 12ft (the length of each riser section), it is necessary to fit the fire resisting barriers into short lengths of busbar trunking, or inter-floor barrier boxes, which are provided with the necessary copper bar. The short sections containing the fire resisting panels are fitted into the floor and ceiling depth in line with the vertical plane of the riser at the commencement of installation. When the units are in position they are connected one to the other with units of rising trunking made to the required lengths.

In this building the rising mains have to negotiate many bends and sets all of varying degree, but such features are taken into account during manufacture.

Although at first the contractors thought the installation of the rising main a forbidding prospect, in practice they found it easily manœuvrable and very adaptable. Two men only were employed on the installation. It was found that the extra cost of the system was more than met by the reduction in labour costs.

## Proposed Belfast Inquiry

BELFAST Corporation has been informed by the Ministry of Commerce that it should consider carefully and define precisely the matters into which it desires an inquiry to be held concerning administration of the Electricity Department. The Ministry also states that "if an inquiry instituted under the Tribunals of Inquiry (Evidence) Act, 1921, should appear inappropriate for the purpose it has in mind, the Minister would be prepared in the light of this additional information to consider any suggestions the Council might make as to alternative powers of inquiry which it might consider suitable to invoke, or might be created for the purpose." This matter arose out of the dissatisfaction of some members of the Council in the matter of the recent appointment of a city electrical engineer and manager.

# OVERSEAS ELECTRICAL TRADE

## *India the Chief Market for British Goods*

THE pattern of Great Britain's overseas electrical trade in October closely followed that of recent months. For the most part industrial equipment remained in good demand while domestic appliance exports were on a much smaller scale than last year. India is now firmly established as the principal market for British electrical manufactures, largely making good the contraction in purchases by Australia. In the first ten months of this year the value of goods and apparatus (not including machinery) sent to India was £9,263,642, which compares with a total of £6,447,543 in the corresponding period of last year.

It will be seen from Table I that the aggregate value of exports in October was £15,182,007 against £15,299,578 in the corresponding month of last year, which contained an equal number of working days. This reduction of 0·7 per cent compares with a decrease of 1·7 per cent in September (£13,602,057 against

**TABLE I.—ELECTRICAL EXPORTS**

| Class | Oct., 1951 | Oct., 1952 |
|---|---|---|
| | £ | £ |
| Telegraph and telephone cables and wires (submarine) | 39,723 | 175,904 |
| Ditto, not submarine | 350,213 | 737,728 |
| Wires and cables, paper insulated | 623,507 | 1,041,864 |
| Ditto, rubber insulated | 669,368 | 494,731 |
| Ditto, cotton, silk or artificial silk insulated | 84,780 | 95,091 |
| Ditto, enamel, glass or asbestos insulated | 91,990 | 77,660 |
| Ditto, other | 225,065 | 344,519 |
| Commercial radio apparatus | 531,997 | 702,648 |
| Domestic radio apparatus | 420,570 | 347,221 |
| Telegraph, telephone and signalling apparatus | 1,341,773 | 1,667,532 |
| Radio loudspeakers | 52,358 | 33,083 |
| Telecommunication components, n.e.s. | 549,572 | 303,500 |
| Other telecommunication apparatus | 127,365 | 272,989 |
| Valves and cathode-ray tubes | 267,235 | 302,945 |
| Carbons | 31,979 | 14,679 |
| Lamps, exceeding 24 V | 107,976 | 68,067 |
| Ditto, not exceeding 24 V | 44,031 | 22,190 |
| Other lighting appliances | 453,861 | 437,287 |
| Primary batteries | 185,427 | 200,917 |
| Parts other than carbons | 54,153 | 10,946 |
| Accumulators for motor vehicles | 286,135 | 115,320 |
| Ditto, traction | 19,276 | 3,449 |
| Ditto, radio | 2,894 | 3,009 |
| Other portable accumulators | 107,494 | 94,539 |
| All other accumulators | 41,515 | 48,852 |
| Parts and accessories | 95,013 | 58,207 |
| Cooking appliances | 242,631 | 100,045 |
| Heating appliances | 70,645 | 79,654 |
| Parts and accessories for cooking and heating appliances | 87,747 | 78,740 |
| Flat irons | 104,823 | 61,665 |
| Commercial electrical instruments | 122,296 | 150,174 |
| House service meters | 145,730 | 117,364 |
| Time recorders and time switches | 18,015 | 8,738 |
| Other electrical instruments | 118,386 | 127,534 |
| Electro-medical apparatus (not X-ray) | 39,875 | 34,355 |
| X-ray apparatus, tubes and parts | 219,579 | 143,442 |
| Permanent magnets | 33,227 | 30,862 |
| Insulating cloth and tape | 108,882 | 51,688 |
| Other insulating materials | 141,137 | 72,842 |
| Unclassified electrical goods and apparatus | 550,461 | 595,650 |
| TOTAL, electrical goods and apparatus | 8,808,704 | 9,327,630 |
| Diesel driven generators not exceeding 200 kW | 487,433 | 298,119 |
| Ditto, exceeding 200 kW | 73,031 | 404,036 |
| Other generating sets | 331,410 | 110,741 |
| Generators exported without prime movers, and parts of generators | 501,546 | 496,520 |
| Motors, railway, tramway and trolley bus | — | 7,627 |
| Ditto, other, not over ½ h.p. | 191,725 | 143,701 |
| Ditto, over ½ h.p. but under 1 h.p. | 69,119 | 37,153 |
| Ditto, from 1 h.p. to 250 h.p. | 490,787 | 420,789 |
| Ditto, exceeding 250 h.p. | 75,973 | 130,737 |
| Ditto, parts | 87,345 | 90,311 |
| Converting machinery | 34,005 | 17,435 |
| Transformers, including coils | 892,795 | 943,318 |
| Rectifiers for power house use | 65,971 | 118,817 |
| Motor starting and controlling gear | 147,994 | 232,791 |
| Switchgear and switchboards (not telegraph and telephone) | 1,052,679 | 1,251,894 |
| TOTAL, electrical machinery | 4,501,813 | 4,703,989 |
| Washing machines (not exceeding 250 lb weight) | 733,080 | 322,480 |
| Ditto, parts | 37,174 | 14,410 |
| Vacuum cleaners | 342,528 | 142,980 |
| Ditto, parts | 44,264 | 16,940 |
| Other electrically operated portable appliances and parts | 359,343 | 162,174 |
| Portable electric tools | 113,830 | 108,773 |
| Unspecified electrical machines, machinery and parts | 358,842 | 382,631 |
| GRAND TOTAL | 15,299,578 | 15,182,007 |

£13,835,566 a year ago) so that in effect there was a slight improvement. The most satisfactory feature was again the substantial exports of wires and cables, amounting to £2,967,497 against £2,084,646 in October, 1951. Exports of the paper-insulated type, in fact, rose from £623,507 to £1,041,864, purchases by India amounting to £283,440 (against £156,014). Telegraph and telephone equipment is another mainstay of our overseas trade, last month's exports of this kind aggregating £1,667,532 (against £1,341,773). Of special note in this section is the development of the Brazilian market, with purchases of £159,421 (against only £2,503 in October, 1951), while for the first ten months of the year the total amounted to £724,339 (£151,815).

The South American country has also increased her imports from this country of generating plant (from £426,942 to £504,408), motors (from £148,706 to £232,021) and "other electrical machinery" (from £314,320 to £460,499). Table II, which analyses the distribution of electrical goods exported, shows substantially improved trade with British East and West Africa, Turkey and Iran as well as with Brazil. Turkey's purchases so far this year have increased from £690,589 to £1,801,861.

Despite the sharp falls in exports of cooking and heating appliances, flat irons, accumulators, etc., the total for goods and apparatus as a whole was greater than a year ago and this was also the case with electrical machinery, the main fall being in electrically operated equipment such as vacuum cleaners, electric tools, etc., exports of which in the aggregate decreased by £838,673 to £1,150,388.

Imports of electrical goods and apparatus in October amounted to £684,656 (against £646,906), the Netherlands being the chief supplier (£201,510 against £252,010).

**Table II.—Distribution of Electrical Goods and Apparatus**

| Destination | Oct., 1951 | Oct., 1952 |
|---|---|---|
| | £ | £ |
| Channel Islands .. .. | 41,020 | 38,714 |
| Gibraltar .. .. .. | 9,023 | 44,719 |
| Malta and Gozo .. .. | 14,382 | 12,526 |
| Cyprus .. .. .. | 19,188 | 38,181 |
| British West Africa .. .. | 169,750 | 213,776 |
| Union of South Africa .. | 876,320 | 855,029 |
| Northern Rhodesia .. .. | 40,763 | 75,887 |
| Southern Rhodesia .. .. | 166,489 | 138,004 |
| British East Africa .. .. | 163,023 | 393,799 |
| Bahrein, Qatar and Trucial Oman .. .. .. | 24,336 | 34,252 |
| Kuwait .. .. .. | | 84,057 |
| India .. .. .. .. | 759,397 | 972,480 |
| Pakistan .. .. .. | 299,977 | 190,675 |
| Malaya .. .. .. | 409,471 | 435,379 |
| Ceylon .. .. .. | 84,649 | 129,374 |
| Hong Kong .. .. .. | 190,045 | 137,005 |
| Australia .. .. .. | 1,137,626 | 777,278 |
| New Zealand .. .. .. | 549,143 | 486,724 |
| Canada .. .. .. | 311,406 | 337,601 |
| British West Indies .. .. | 87,961 | 170,774 |
| Anglo-Egyptian Sudan .. | 52,006 | 51,143 |
| Other Commonwealth Countries .. .. .. | 114,136 | 117,770 |
| Irish Republic .. .. | 303,952 | 294,010 |
| Soviet Union .. .. .. | 12,356 | 20,937 |
| Finland .. .. .. | 88,452 | 41,642 |
| Sweden .. .. .. | 219,620 | 195,853 |
| Norway .. .. .. | 45,590 | 20,341 |
| Iceland .. .. .. | 108,917 | 142,954 |
| Denmark .. .. .. | 35,468 | 16,234 |
| Poland .. .. .. | 79,003 | 59,820 |
| Germany .. .. .. | 34,947 | 59,631 |
| Netherlands .. .. .. | 269,239 | 211,196 |
| Belgium .. .. .. | 149,091 | 196,734 |
| France .. .. .. | 116,608 | 120,208 |
| Switzerland .. .. .. | 72,230 | 48,121 |
| Portugal .. .. .. | 57,565 | 90,464 |
| Spain .. .. .. .. | 27,100 | 56,950 |
| Italy .. .. .. .. | 110,886 | 110,488 |
| Austria .. .. .. | 56,045 | 11,725 |
| Czechoslovakia .. .. | 44,787 | 14,588 |
| Greece .. .. .. | 89,331 | 57,906 |
| Turkey .. .. .. | 90,424 | 175,372 |
| Portuguese East Africa .. | 15,840 | 26,135 |
| Syria .. .. .. .. | 39,876 | 10,349 |
| Lebanon .. .. .. | 27,331 | 56,823 |
| Israel .. .. .. | 56,378 | 40,113 |
| Egypt .. .. .. .. | 252,182 | 143,512 |
| Arabia .. .. .. | 23,480 | 12,101 |
| Iraq .. .. .. .. | 76,563 | 129,392 |
| Iran .. .. .. .. | 5,316 | 14,782 |
| Burma .. .. .. | 60,668 | 65,915 |
| Thailand .. .. .. | 70,904 | 53,241 |
| Indonesia .. .. .. | 24,901 | 71,132 |
| China .. .. .. .. | 20,437 | — |
| United States of America .. | 118,790 | 77,911 |
| Venezuela .. .. .. | 25,045 | 109,518 |
| Peru .. .. .. .. | 44,614 | 44,110 |
| Chile .. .. .. .. | 30,455 | 28,577 |
| Brazil .. .. .. .. | 63,702 | 220,565 |
| Uruguay .. .. .. | 8,672 | 20,743 |
| Argentine Republic .. .. | 101,953 | 53,753 |
| Other Foreign Countries .. | 209,875 | 448,039 |
| Total .. | 8,808,704 | 9,327,630 |

## Import Quotas

THE Board of Trade Import Licensing Branch, Romney House, Tufton Street, London, W.1, has issued Notice to Importers No. 527 giving the import quotas fixed for a number of commodities for the first half of 1953. Among them are the following:—Electrical typewriters and parts, £20,000; glassware (including illuminating glassware of all kinds), £320,000; electrical appliances (including bells and buzzers, blankets and pads, coffee percolators, cooking apparatus, drink mixers, fans, floor polishers, hairdressing appliances, irons, kettles, shavers, toasters and vacuum cleaners), £40,000; electric lighting appliances (including handlamps and torches, filament and discharge lamps, and lighting appliances and fittings not containing glassware except for insulating purposes), £75,000; miscellaneous appliances, electric or non-electric (including domestic dish-washing machines, washers and dryers, lawn mowers and refrigerators not exceeding 12 cu ft), £25,000.

# Efficient Poultry Keeping

## Improved Appliances on View at Olympia

AT a time when eggs are both scarce and dear the application of the most efficient methods of poultry farming is of particular importance. Visitors to Olympia last week, when the National Poultry Show organized by *Poultry World* and the *Farmer and Stock-Breeder* was held, were able to see appliances of many kinds for reducing labour costs and making the most of the available feeding stuffs.

The deep-litter system of poultry keeping has gained in popularity in recent years. A new automatic feeder shown by Thornber Bros., Ltd., is particularly suitable with this form of management, though also useful for hen yards and intensive houses. From a hopper food is "shaken" along a narrow 8ft to 64ft long trough until it reaches a tippling dish. When the dish is full, the $\frac{1}{4}$ h.p. motor switches off, being automatically restarted when the food has been eaten. About a hundred birds can be maintained for three days on the 1 cwt of food in the hopper.

Several manufacturers exhibited battery cages on the cafeteria principle with automatic feeding, watering and cleaning facilities. The new "Visi-Chick" quick-feed laying cage unit has continuous food troughs with a dish-like depression in front of each cage to receive the food from the hopper which passes from one end to the other. The 1 h.p. electric motor used for the power-operated type is portable and can be moved from one unit to another. Four-tier cafeteria cages shown by Autofeed (Canterbury), Ltd., have time-switch controlled lighting for night feeding. The McMaster automatic fattening battery is operated by a $\frac{1}{3}$ h.p. motor coupled to a 500–1 triple reduction gear and fitted with a patent cut-out coupling switch. It is claimed that to maintain a flock of 6,000 birds necessitates only three hours' work a day, with an additional five hours each week for cleaning pits, etc.

Accurate sexing of day-old chicks is important and this is possible with the "Chixexer" shown by Expert Chick Sexers, Ltd. The instrument contains a small lamp—battery or mains operated through a transformer—for the direct inspection of the embryonic organs, magnified by a lens. Another device of this kind was demonstrated by Sexascope (London), Ltd.

The range of electric cabinet incubators displayed by Western Incubators, Ltd., all with automatic hourly turning, included models for both turkeys and chickens. Among other exhibitors of incubators and brooders were the Stephens Cabinet Incubator Co., Ltd., the Visi-Chick Brooder Co., Ltd. (including the "Visi-Sunray" electric heating unit), Cope & Cope, Ltd., Clarbat, Ltd. (who also showed piglet warmers), and Millers Appliance Works, Ltd. Food

The Electrical Development Association's demonstration kitchen at the National Poultry Show

mixing machines of various kinds were to be seen on the stand of New Harvest, Ltd., and for the dairy farmer the Churn Co. offered a range of "Electrochurns." Of interest to farmers without a mains electricity supply, or for providing a stand-by source of power, there were the diesel and petrol electric generating units shown on the stand of Dale Electric (Yorkshire), Ltd.

In the popular "Chicken in the Kitchen" section the British Electrical Development Association arranged two kitchens, both open to the public, one for the preparation of food and the other for demonstrations in cookery given by Miss Marguerite Patten (the B.B.C. television expert), assisted by demonstrators from various Electricity Boards.

# Electrolytic Testing

TWO papers presented at a joint meet- of the I.E.E. Supply and Measurements Sections on 26th November related to electrolytic technique. The first, by Mr. D. McDonald (B.T.H. Co.), applied the electrolytic analogue to the design of high voltage power transformers. The second, by Dr. K. F. Sander and Mr. J. G. Yates (Cambridge University), was concerned with the accurate mapping of electric fields in an electrolytic tank.

Increases in transmission voltages in Great Britain from 132 kV to 275 kV and probably 400 kV later, Mr. McDonald pointed out, magnified the problems of transformer insulation. Power frequency tests at 500 MVA were now common, while impulse test levels exceeded 1,000 MVA. Electrostatic field problems were too complicated for solution by analytical methods and too tedious for graphical treatment. Analogue techniques, however, using an electrolytic tank, resistor networks, conducting sheets and rubber membranes, permitted of straightforward analysis accurate enough for all engineering purposes.

Stresses in insulating materials within a transformer were, in magnitude and direction, a function of the electrostatic field. This in turn depended upon the shape and relative disposition of the windings, bushings, leads, core, clamps and tank, upon the voltages between these parts and upon the permittivity and arrangement of the intervening insulation.

The author discussed the theory and practical use of the electrolytic analogue, indicating its flexibility in its applicability to h.v. potential and current transformers also. The analogue could locate regions, magnitude and direction of high stress and achieve appropriate insulation strength, it being easy to make modifications and to determine their quantitative effect. Other possible uses included analysis of magnetic flux and temperature distribution in transformer cores, investigation of leakage inductance and eddy current loss.

The paper by Dr. Sander and Mr. Yates concerned an investigation into errors arising in electrolytic tank systems used for field plotting, where an accuracy within 0·1 per cent was necessary in determining the components of the potential gradient vector. The authors proposed a new method which used square wave excitation and liquid probes instead of sinusoidal excitation and metal probes. Experimental evidence was submitted to show that this method made the performance of an electrolytic tank less dependent on the electrode materials and their cleanliness and that it was more suited to automatic measurement. Choice of electrode material was determined largely by secondary considerations such as ability to stay clean and insolubility in the electrolytic. Optimum conductivity represented a compromise between a small value to minimize polarization errors and a larger one to reduce probe impedance.

## I.E.E. Christmas Lecture

THE Institution of Electrical Engineers has again arranged a Christmas lecture for older schoolchildren, which will be held on 1st and 2nd January at the Institution, Savoy Place, W.C.2. The lecture, "Sound Broadcasting" will be given by Dr. K. R. Sturley, head of the Engineering Training Department of the British Broadcasting Corporation.

# Thermal Motor Protection Relays

THE thermal capacity of the motor is employed in new motor protection relays developed by Chamberlain & Hookham, Ltd., Solar Works, New Bartholomew Street, Birmingham, 5. Three models are available:—The "H" type is for protecting three-phase star- or delta-connected induction motors against overload or single-phasing conditions where the starting current does not exceed seven times normal full load; type "HST" provides similar protection for larger motors with starting currents over seven times full load and where starting conditions may be prolonged by high inertia loads; instantaneous protection against short circuit faults is an additional protection obtainable in type "HST/AM" which is similar to the "HST" in all other respects.

In the type "H" relay (Fig. 1) three bimetal spirals, fixed at their centres, receive heat from three metal grids carrying currents proportional to the three line currents energizing the motor. The deflection of each spiral is directly related to the current in its associated heater—and the ambient temperature—but the relative movement of the free ends of the spirals is only a function of the difference between the currents flowing in the associated motor lines.

The free end of the centre spiral ends in two forked contacts the members of which "enclose" single contacts secured to the other two spirals. Each fork has its prongs

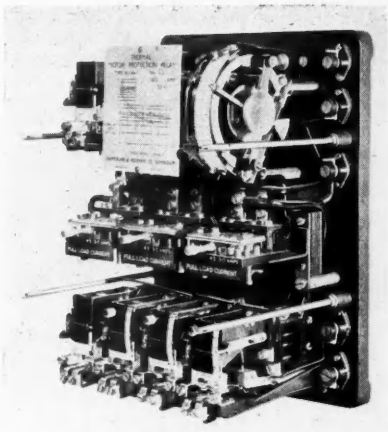
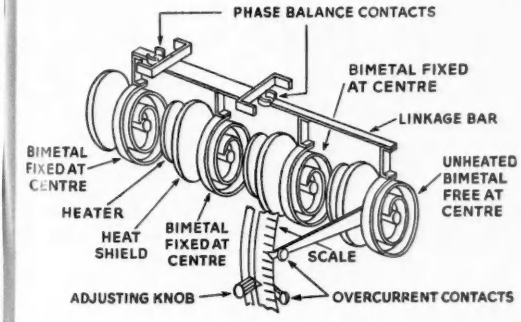


**Fig. 2.—Complete thermal motor protection relay, with cover removed. The indicators are in the closed position**

spaced so that a 12 per cent difference in the currents of adjacent elements will cause engagement of the appropriate single contact. Current will then flow to operate a breaker system and the indicator described later. Thus any phase unbalance of 12 per cent at full load will operate the protection device.

A fourth bimetal spiral has no associated heater and is sensitive only to changes of ambient temperature. Its outer end is attached to the free end of one of the heated spirals and the inner end, which is freely pivoted, is attached to an arm terminating in a contact. The movement of the latter is dependent only on the heat supplied to the adjacent heater bimetal spiral since the deflection of the unheated spiral due to ambient temperature change is in the opposite direction to that of the heated bimetal. A scale is fixed near the contact arm, calibrated in percentage of full load, and an adjustable contact is arranged on the scale

**Fig. 1.—Arrangement of bimetal strips and contacts in type "H" relay**



so that it may be engaged by the contact arm at any predetermined line current between 50 and 150 per cent of normal full load. This device provides overload protection.

The indicator (Fig. 2) can be arranged to be connected in series or parallel with the trip coil. Each contactor is fitted with two changeover contacts which can be connected as two normally open, two normally closed or one open and one closed. The indicator is of a new design incorporating a flap which is rotated through 180 deg about one edge. The flap normally covers a plate of its own size but on rotation exposes the plate together with its own reverse side.

The type "HST" relay employs precisely the same principles but the heaters are supplied from three saturable transformers. The third model, type "HST/AM," incorporates all the features of the "HST" and in addition is fitted with three instantaneous relays, type "AM," each connected in series with a saturable transformer.

# Steel Bill Protest

SEVEN leading representatives of the engineering industries, including Mr. T. F. Lister, chairman of the B.E.A.M.A. Council, Mr. D. D. Walker, president of the British Engineers' Association, and Mr. K. J. McKillop, director of the Water Tube Boilermakers' Association, expressed their concern, in a letter to *The Times* last week, regarding certain provisions of the Iron and Steel Bill now before Parliament. They stated that the Bill included the processes of casting, rolling and forging as carried out by engineering manufacturers within, and as part of, their own undertakings. This implied interference and control by the proposed Iron and Steel Board with a large number of such manufacturing concerns.

The signatories gave a number of examples in which this interference might be exercised and said that to place under the jurisdiction of the Board a comparatively small section of a manufacturing works which had never been a part of the iron and steel industry and which, to operate efficiently, must function under one unified system of works organization was running counter to all hitherto accepted canons of efficient administration.

One effect might be the restriction of expansion of production in engineering works by preventing their owners (subject to an appeal to the Minister of Supply) from reconstructing, adapting or adding to their forges and foundries.

Amendment of the Bill is called for to avoid interference with those industries whose casting, rolling or forging of iron and steel are departmental means to an end and not, as in the iron and steel industry proper, an end in themselves.

In a subsequent letter Mr. W. S. Shepherd, M.P., defends the principle of general supervision by the Board on "an industry basis where competition does not provide automatic safeguards." The exclusion of firms which forge for their own use would mean that the Board could not act effectively in the provision of raw materials. Mr. Shepherd contends that for this reason the inclusion of the firms represented by the signatories of the first letter would appear to be in their own interests. Fear of restricted development is held to be unfounded as safeguards against this appear in the Bill.

In another letter Sir Alfred Herbert, as a machine tool maker, endorses the original protest. He says that it might be better to accept the *fait accompli* of nationalization and thus avoid the bitter controversies and the vast amount of work which the Bill will involve if it becomes an Act. There is no indication that the Bill will effect any improvement in the supply of steel to his company and other engineering establishments. The "incredible proposal" to extend control to iron foundries must be resisted by all engaged in engineering. "Why," Sir Alfred asks, "should control be applied to them rather than to the many other departments of the engineering trade?" He wonders whether it may not be the thin end of a wedge intended gradually to extend control to the whole engineering industry.

## Ulster Rural Supplies

A DEPUTATION from trade unions concerned with the production and distribution of electricity interviewed Mr. W. V. M'Cleery, Northern Ireland Minister of Commerce, on 12th November and put before him a number of points relating to electrical development, particularly in the rural areas, and the value of such development in the provision of employment. The Minister, who undertook to give careful consideration to the views expressed, stated that the whole question was receiving the close attention of the Northern Ireland Government.

# Commerce and Industry

## *Building Control Changes*

## *Non-Ferrous Metal Supplies*

THE Minister of Works, answering questions in the House of Commons on 18th November, said that he proposed three changes in the licensing system for building. Early this year the volume of maintenance work of all kinds showed signs of falling off. From 1st July last the free limit for housing and general work was raised from £100 to £200 in a period of twelve months, but this did not arrest the decline. He now proposed to alter the licensing period to the calendar year. This change would help painters and other building workers for whom there was usually less work in the winter. The current licensing period, for which the limits were £500 for industrial and agricultural buildings and £200 for all other buildings, would be brought to an end on 31st December next. This meant that the full amounts would be available during the period of six months. For the calendar year 1953 the free limits would be for industrial and agricultural buildings £2,000, and for all other buildings £500.

### Nationalization and Efficiency

Yet another study of nationalized industries has made its appearance. It is published for the Institute of Public Administration by George Allen & Unwin, Ltd., 40, Museum Street, London, W.C.1, at 7s 6d, under the title "Efficiency in the Nationalized Industries" (65 pp.). There is a foreword by Mr. Herbert Morrison, C.H., M.P., and four long essays by the chairmen of the National Coal Board, London Transport Executive and the B.E.A., and the deputy-chairman of the Gas Council.

Lord Citrine's contribution is a survey of the structure of the electricity supply industry as a nationalized service. He stresses that this structure was carefully devised with a view to obtaining maximum efficiency in administration and operation. It is not regarded as sacrosanct, however, and changes will be made wherever they are found to be necessary. For this purpose an Organization Review Committee is operating and, it is probable, will produce an interim report in the next few months.

### Coupling Box Damaged in Mine

Rough handling and arduous working conditions are not new experiences for B.I.C.C. mining type coupling boxes made by British Insulated Callender's Cables, Ltd., and an example of their robustness was recently

**B.I.C.C. coupling box which, although damaged in a mine accident, still continued to function**

provided when a coupling box sustained the full impact of a number of pit tubs that ran away down an incline. Though distorted the box did not fail electrically nor was any damage sustained by the switch to which the coupling box was attached.

### Special Train for Transformers

On 18th November a special train departed from Cheshunt goods yard conveying two large transformers weighing over 61 tons each on two special wagons. The other portion of the train consisted of six wagons of contractors' tools and equipment. The transformers, which were built by the Asea Electric, Ltd., were destined for the Rye House power station, Herts.

### Plumber Jointers' Wage Increase

The Standing Joint Committee on Plumber Jointers of the Joint Industrial Council for the Electrical Cable Making Industry has agreed to terms of settlement of the application of the trade unions for an increase in wages to plumber jointers and to other grades coming within the scope of the plumber jointers' agreement. The rates of pay of plumber jointers both in London and in the country have been increased by 2½d an hour, and consequential increases have been made in the rates of pay of plumber jointers' mates and of youths and boys. These increases became effective as from the beginning of the first full pay period starting on or after 17th November. The new rates for plumber jointers are:—3s 10½d an hour

in the London area (basic 2s with a bonus of 1s 10¾d), and 3s 7¼d an hour throughout the rest of the country (basic 1s 9¾d with a bonus of 1s 9½d).

In regard to the new rates for plumber jointers' mates, the Committee has further agreed that, at 85 per cent of the plumber jointers' rates, these shall be as follows:—In the London area 3s 3¾d an hour; throughout the rest of the country 3s 0¾d an hour.

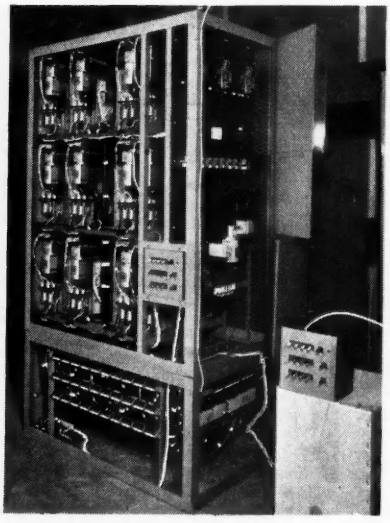
## Invitations to the B.I.F.

To ensure that potential buyers overseas are invited to visit the Birmingham Section of the British Industries Fair next year electrical exhibitors have been asked to send to the Fair manager, Mr. H. O. Missenden, Birmingham Chamber of Commerce, 95, New Street, Birmingham, 2, duplicate lists of firms and individuals overseas whom they think should receive invitations.

## Ballroom Fluorescent Lighting

A new two-station control automatic dimmer board for ballroom lighting has just been completed by the "Atlas" Theatre Lighting Division of Thorn Electrical Industries, Ltd. Three banks of four motor operated dimmers, one for each colour, are raised or lowered by operation of a switch either on the main panel, or on the remote panel near the band platform. A switch to the right of the top bank transfers control, the operative station being indicated by a small pilot light.

**"Atlas" theatre lighting control board**



The banks are divided into four circuits. Two control five 80 W tubes each, and two ten 80 W tubes each. The total lighting load all colours, is therefore 7·2 kW plus about 800 W control gear losses and motor load. A separate motorized camshaft takes control, on depressing the switch to the right of the second bank, to give a sequence of changing colours, pre-set by adjusting the position of the cams on the camshaft. The speed of the sequence is controllable from a knob on the main panel. This unit can be seen to the right of the board in the accompanying illustration. "Black-out" contactors at the top of the board are governed by the third switch on the panels.

This board is scheduled for installation in the Nottingham Palais de Danse early next year in connection with an extensive electrical reorganization being carried out by Blackburn, Starling & Co., Ltd., electrical contractors.

## Irish Electrians' Strike Ends

Electricians employed by the C.I.E. (the Irish transport organization) decided last week to return to work after being on strike for seventeen months. The dispute began in June last year when the men were refused the district rate of 3s 8½d an hour which they had claimed. Two Labour Court recommendations were rejected by the Electrical Trades Union.

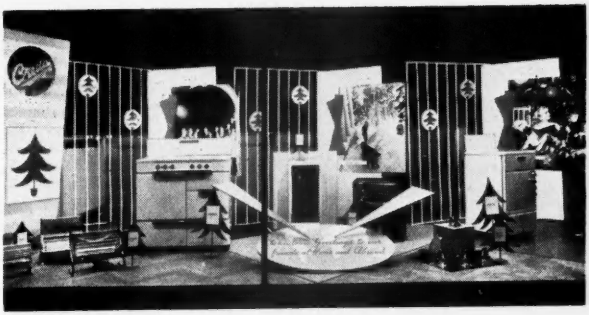
## Australian Manufacturing Industries

In January, a comprehensive reference book published by the Commonwealth Government of Australia under the title "The Structure and Capacity of Australian Manufacturing Industries" will be made available in the United Kingdom and Western Europe from Angus & Robertson, Ltd., 48, Bloomsbury Street, London, W.C.1, price 63s. Apart from furnishing up-to-date and detailed information on the expansion of the Australian basic industries such as those producing iron and steel, electric power, copper, aluminium and heavy chemicals, etc., the book covers the entire range of the manufacturing industry, its organization, the inter-relation of enterprises and the adequacy of present production to meet present and potential markets. Current developments in basic industries are emphasized; these include the doubling of electrical generating capacity, a 50 per cent increase in the winning of black coal and a 100 per cent increase in brown coal, and a 45 per cent increase in iron production.

## Television Equipment Orders

Pye, Ltd., announces that the German authorities have decided to use British equipment in the German television service. Orders have been received for the installation of television cameras and their associated equipment by the Bayerische Rundfunk, Munich, and the Nordwestdeutscher Rundfunk, Munich and Hamburg. British equipment will be used by

Siam, the first country in S.E. Asia to install television. A contract for two installations, each complete from camera to receivers, has been agreed with Marconi's Wireless Telegraph Co., Ltd., by the Department of Public Relations, Government of Thailand. One of the installations will be in operation at Chulalongkorn University, Bangkok, by 7th December, in time for the opening of the Constitution Fair, and the other in the early summer of 1953 for the Director of Public Relations. Both systems will operate on a 625-line standard.



**A Christmas display by the Simplex Electric Co., Ltd., at its Tottenham Court Road showrooms**

The English Electric Co., Ltd., is providing a number of its standard 16in table model receivers. These are equipped with hand-switched voltage regulators enabling the sets to operate on voltages from 80 to 200 a.c.

Three Marconi engineers are leaving at the end of this month to set up and operate equipment for the first installation which will be air-freighted separately. They will also train local technicians and officials in the working of the apparatus.

## Cables for Aircraft

The British Standards Institution has published British Standard E.21 "Electric cables for aircraft (glass and polychloroprene insulated)" specifying the requirements for four ranges of cables for the wiring of aircraft circuits where the potential between conductors, or between a conductor and metal braid or the aircraft structure does not exceed 250 V (r.m.s.) and 1,600 c/s. The types covered are "Pren," "Prenal," "Prenmet" and "Prensheath." Copies of this standard may be obtained from the B.S.I. Sales Branch, 24, Victoria Street, London, S.W.1, price 3s 6d each.

## Battery Orders

Recent orders received by the Alton Battery Co., Ltd., include batteries up to 1,500 Ah capacity for telephone exchanges at Edgbaston, Garforth, Sheffield and Tenby and for Lerwick (Shetlands) telephone repeater station. Other orders in hand include the renewal of two 2,600 Ah batteries at Wigan and new batteries for Ellesmere Port, Tamworth and Nursling (Southampton) substations.

## Christmas Window Display

The accompanying picture shows one of the Christmas window displays now installed at the Tottenham Court Road showrooms of the Simplex Electric Co., Ltd. Large coloured mural pictures in the background trace the traditional story of Christmas pleasure at home, in South Africa and in Tasmania.

## Private Trading in Zinc

The Ministry of Materials has now confirmed that the date for the resumption of private trading in zinc will be 1st January next. The Directorate of Non-Ferrous Metals, Rugby, will terminate its existing sales arrangements on 31st December. Consumers will be able, if they wish, to purchase in December zinc for delivery in January on the Ministry's usual sales terms. The Committee of the London Metal Exchange has informed the Ministry that Exchange dealings in zinc will begin on 2nd January.

The Ministry of Materials states that it is its policy to release from its stocks not more than a relatively small tonnage for sale during the early months after the resumption of private trading. A further announcement will be made about import and export licensing arrangements.

## Economy in Metals

The need for economy in the use of alloying and non-ferrous metals is still urgently necessary. This is emphasized in the first report of the Metals Economy Advisory Committee (H.M. Stationery Office, price 9d), set up by the Minister of Supply in conjunction with the Minister of Materials in August, 1951, to study ways in which scarce metals could be saved in industry. The shortage of these metals is no longer critical, but supplies of many metals are still only sufficient for essential needs.

The Committee states that only in the cases of lead and zinc have the shortages of eighteen months ago entirely disappeared. Nickel, cobalt and copper, in particular, are still causing concern, and a sufficient supply of other metals for essential purposes can be maintained only by restrictions on less essential uses. Some slackening off in the drive for economy is expected as a result of improved supplies and

it is therefore vital that the fullest publicity should be given to the continuing urgent necessity for making the best and most economical use of metals.

## Prices of Materials

**In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.**

| | |
|---|---|
| ALUMINIUM Ingots .. .. | ton £166 0s 0d |
| COPPER, H.C. Electro .. .. | ton £285 0s 0d |
| Fire Refined 99·70 per cent .. | ton £282 10s 0d |
| Fire Refined 99·50 per cent .. | ton £271 0s 0d |
| COPPER Tubes .. .. .. | lb 2s 8½d |
| Sheet .. .. .. .. | ton £339 0s 0d |
| H.C. wire and strip .. .. | ton £317 15s 0d |
| LEAD, English .. .. .. | ton £89 15s 0d |
| Foreign .. .. .. .. | ton £88 0s 0d |
| MERCURY .. .. .. .. | flask £79 10s 0d |
| TIN .. .. .. .. .. | ton £962 0s 0d |
| ZINC, G.O.B. Foreign .. .. | ton £110 0s 0d |
| Electrolytic .. .. .. | ton £114 0s 0d |
| BRASS Tubes .. .. .. .. | lb 2s 2½d |
| Sheet .. .. .. .. | lb 2s 5¼d |
| Wire .. .. .. .. | lb 2s 8½d |
| PHOSPHOR BRONZE | |
| Wire .. .. .. .. | lb 4s 1½d |
| RUBBER, No. 1 R.S.S. spot .. | lb 25d–25½d |

## B.E.A.M.A. Contract Price Formulæ

The British Electrical and Allied Manufacturers' Association has issued the October figures for its contract price adjustment formulæ. In each case the rate of pay for adult male labour at 10th November is deemed to be 141s 6d. The " cost of material " figures are as follows:—

For electrical machinery and equipment: the Board of Trade index figure published on 15th November is 166·6.

For turbo-generating and allied plant: materials used in mechanical engineering industries, 150·6; blast furnaces and iron and steel smelting and rolling (40 and 41), 142·5; price of ⅜in o/d 18 s.w.g. brass condenser tubes (*Metal Bulletin*, 21st November), 3s 11⅝d.

Outstanding contracts covered by the Board of Trade intermediate products index: The index figure for intermediate products (10th November) is 359·8.

## B.I.C.C. Education Scheme

Speaking at the annual presentation of awards to students of British Insulated Callender's Cables, Ltd., further education scheme recently, Lt.-Gen. Sir Ronald M. Scobie, a director of the company, emphasized the need for enthusiasm in educational pursuits. He said that opportunities for advancement were continually presenting themselves and could be more readily seized by those who had acquired the appropriate training and educational qualifications. He presented awards to more than 150 employee students, about one-third of whom had taken courses at the company's day continuation school which functions under the authority of the Lancashire County Council Education Committee. The remainder of the students were those who had gained successes while attending local technical colleges. The presentations were made in the Warrington Road Canteen at the B.I.C.C. Prescot Works and Mr. E. Bowyer, manager (production), who opened the proceedings, welcomed representatives from the local and county education authorities, and accorded a special welcome to the parents of the students.

## Objections to Board's Trading

Members of the King's Lynn Chamber of Trade who recently complained to their member of Parliament (Commander R. Scott-Miller) that the Eastern Electricity Board was enclosing propaganda leaflets advertising equipment for retail sale when rendering accounts, are to take further steps in the matter. The objections of the Chamber are based on the grounds that public servants and public funds are being used for advertising. Comdr. Scott-Miller stated, in a reply to the Chamber, that he had taken the matter up with the Ministry of Fuel and Power, and had been advised that the Chamber should approach the chairman of the Eastern Electricity Board. This is being done and the attention of the National Chamber of Trade is being drawn to the practice.

## Masseur's Death

An inquest was held at Bradford last week on Thomas Henry Harrison (45), masseur and osteopath, who died from an electric shock received when using a massage machine and an infra-red heater on a patient at a physiotherapy clinic. A verdict of " Misadventure " was recorded. Mr. J. Sugden, of the Yorkshire Electricity Board, stated that the wiring to the infra-red heater was faulty. He said he had arrived at the conclusion that Harrison had touched the faulty part of the heater with one hand while holding the vibrator of the massage machine in the other, and in that way had received an electric shock. He was satisfied that the installation and repairs of the apparatus had been carried out by a person unskilled in electrical work. The coroner, Mr. R. S. Bishop, said that people who operated such rather formidable looking instruments should be warned of the real danger which existed if the electrical equipment was not properly fitted by an expert, earthed and maintained in good order.

## Overhead Line Construction

The Electrical Development Association has issued a new publication—a diagram of procedure, which should be of considerable assistance to wayleaves officers and others concerned with the construction of overhead power lines. Measuring 28½in by 19in and printed in three colours, the diagram and accompanying notes

set out clearly the procedure which should be followed in order to obtain approvals and consents with the minimum of delay under present legislation. Before an overhead transmission line can be run over land or water there are a number of amenity associations and similar bodies which have to be consulted, such as the National Trust, the Fine Art Commission and the Society for the Preservation of Rural England, quite apart from certain Government Departments.

For some time the Association has received requests for a co-ordinating procedure in order to simplify administration. Copies of the diagram, number EDA 1725, can be obtained, free of charge, from the Association at 2, Savoy Hill, London, W.C.2.

## Works Visit

On 20th November three cinema operators on the Star circuit visited the Rugby and Coventry Works of the British Thomson-Houston Co., Ltd., as a special prize in the "best kept box" competition in the efficiency campaign promoted by Mr. W. Eckhart, managing director of Star Cinemas (London), Ltd. The morning was spent on a tour of the Rugby Works, and after lunch the visitors proceeded to the Coventry Works to examine the methods of manufacture of B.T.H. 35 mm equipment and of 16 mm projectors.

## Unusual Ballroom Lighting

The dance referred to under this heading in our issue of 14th November was held by the Newmarket Electricity Supply Sports and Social Club. Lt.-Col. A. E. Knights is manager of the Fens Sub-Area, not the district manager as stated. Mr. A. Forrester is the resident manager at Newmarket.

## Mechanical Handling Film

Richard Sutcliffe, Ltd., Wakefield, announce that their third film, entitled "Three Installations," which shows the use of belt conveyors in various industries, is now generally released and is available for free loan in 16 mm and 35 mm sizes. The film runs for 28 min.

## Trade Announcements

The **Horstmann Gear Co., Ltd.**, has appointed Mr. H. R. Walker as representative for the sale of its electrical products in the London and south coast areas.

The address of **The Phœnix Electrical Co. (London), Ltd.**, is now Phœnix House, 16-18, Marshalsea Road, Borough, London, S.E.1 (telephone : Hop 4834). The works telephone number remains Hop 0673.

The **Telegraph Construction & Maintenance Co., Ltd.**, announces that a branch office will be opened on 1st December at 43, Fountain Street, Manchester, 2 (telephone : Central 0758), under the charge of Mr. J. Taylor. P.v.c. cables and flexibles, and radio frequency and broadcast relay types of cable, will be held in stock at this depot. Subsequently other products manufactured by the company will be added.

A new domestic equipment section has now been formed within the Owen organization. **Easiclene Porcelain-Enamel (1938), Ltd.**, has taken over the marketing of "Castra" electric washing machines and "Gasel" absorption type refrigerators (both made within the organization). All products will be marketed under the trade name "Easicle..e."

**Siemens Electric Lamps & Supplies, Ltd.**, are opening new premises at Siemens House, Bath Road, Brislington, Bristol, on 8th December. The new premises will accommodate adequate stocks of all materials.

The brand name **"Prestcold"** is now being used instead of the company title "Pressed Steel Co., Ltd." in connection with all the company's refrigeration products, installations and activities.

## Catalogues and Lists

**Leeds Fireclay Co., Ltd.**, Wortley, Leeds, 12.—52-page illustrated bound catalogue giving particulars of various kinds of refractory materials and shapes.

**Benjamin Electric Co., Ltd.**, Brantwood Road, Tottenham, London, N.17.—Broadsheet giving details of both tungsten and mercury lighting fittings for industrial use.

**G.M. Engineering (Ottery St. Mary), Ltd.**, 1, Victoria Street, London, S.W.1.—"Otter Mill" switchgear—a priced catalogue giving details of the company's complete range of products (OMS.971).

**Philips Electrical, Ltd.**, Century House, Shaftesbury Avenue, London, W.C.2.—Illustrated technical publication relating to electronic measuring instruments for the laboratory and test bench.

**Standard Telephones & Cables, Ltd.**, Connaught House, Aldwych, London, W.C.2.—Illustrated technical booklet entitled "General Guide to Capacitors" (B/C.13).

**Gresham Transformers, Ltd.**, Twickenham Road, Hanworth, Middlesex.—Three illustrated folders relating to power distribution transformers and hermetically sealed transformers and chokes.

**George H. Scholes & Co., Ltd.**, Wylex Works, Wythenshawe, Manchester.—Illustrated priced folder on the "Wylex" socket (155).

**Thor Appliances, Ltd.**, 64-66, Oxford Street, London, W.1.—Illustrated folder on the Thor "Automagic Spin-Dry" washing machine together with new list of reduced prices.

# IN THE COURTS

## Hire-Purchase Order Contravened

AT the Central Criminal Court last week the Chain Store Finance Trust, Ltd., and J. & F. Stone Lighting & Radio, Ltd., were found guilty on charges of conspiring to contravene the provisions of Article 1 of the Hire Purchase and Credit Sales Agreements (Control) Order, 1952. They were each fined £5,000 and ordered to pay 150 guineas costs.

Counsel for the Board of Trade explained that the Order laid it down that at least a third of the price of an article sold by hire-purchase had to be paid initially and payment of the remainder had to be completed in 18 months. It was alleged that purchasers of television sets from J. & F. Stone's shops were allowed to pay £5 down and 24 monthly instalments of £4. The transaction was covered by a form of hiring agreement but it was understood by the purchasers that upon completion of the 24 instalments the sets would become their property.

Leonard Hyde, secretary of both defendant companies, said that the agreements were hiring agreements. None of the managers of Stone's shops had authority to inform customers that the sets would be their property at the end of two years. The scheme was adopted because competitors were doing something similar.

Counsel for the defence admitted that his clients had made an " ill-advised attempt " but the 1,500 agreements entered into formed only a small part of their business; 30,000 lawful hire-purchase agreements had been made during the same period.

Mr. Justice Parker, in giving judgment, said that the fines must be paid within a month.

## Unlicensed Installation Work

The principal of a firm of electrical contractors, of Whitchurch, Glam., with offices at Torquay, Leonard Winston Morgan, was fined £2,500 at Devon Quarter Sessions at Exeter on 17th November for carrying out £10,000 worth of electrical installation work at the Notre Dame Convent and its associated premises, Buckeridge Towers, Teignmouth, without a licence. He was ordered to pay £500 within a month and £2,000 within four months.

Mr. P. Dewar, who prosecuted, said that in April, 1950, Morgan called at the Convent and examined the electrical installations of the two buildings. He warned the Sister Superior that there was grave danger of fire because of the condition of the installation and advised her that there should be a completely new one. She agreed to his suggestion, and for just over a year he was engaged on completely re-wiring the two buildings.

At one stage of the work the Sister Superior inquired about licences but was told by a foreman that licences had not been required since 1948. In all Morgan received £10,415 7s 6d. The Ministry of Works got to hear of the matter and wrote Morgan several letters. Eventually he replied saying that he was unaware that authorization for the re-wiring of the Convent was required but that he was quite sure authorization would have been granted if the existing wiring had been examined by the Ministry's inspectors. The buildings were subsequently examined by an inspector, who found that the 50 rooms at the Convent and 18 rooms at Buckeridge Towers had been re-wired and that the lighting and power points had been renewed. The installations were of the best type, added Mr. Dewar, who said that Morgan told the police that he honestly did not know a licence was required for the work. Prosecuting counsel said he was instructed to state that if the old wiring had been examined by the appropriate authority and had been found to be dangerous there would have been no impediment to the granting of a licence for that amount. But as there was no examination they were unable to say whether a licence would have been granted.

The chairman, Sir Leonard Costello, asked whether the amount charged was a reasonable one for the work done, and Mr. Dewar replied that there was no suggestion of any extortion and no improper charges.

On behalf of Morgan, who had pleaded guilty, Mr. J. C. Perks said accused was not a properly qualified electrician, but had some experience of electrical work in the Royal Corps of Signals, in which he served. When he came out of the Army in 1944 he went into partnership with two other men, but the partnership broke up and he was left with debts of about £300. At the end of 1945 or the beginning of 1946 he set up business on his own under the style of Morgan & Co., electrical engineers. He obtained work which brought him in an average profit from 1946 until 1952 of £1,000 a year. It might be thought that that work would have brought him up against the licensing regulation, but most of it had been for local authorities in South Wales, and he did not think a licence for re-wiring was necessary; £400 worth of the work could have been done without a licence.

Announcing the Court's decision the chairman said that they had taken into consideration the probability that a licence would have been granted if one had been applied for, that Morgan had carried out the work in a competent and satisfactory manner, and that his profit had not been unreasonable. Nevertheless, where work was carried out without a licence it might mean that material and labour were used for private or semi-private purposes when they ought to be available for work of a public nature.

# ELECTRICITY SUPPLY

## Capital Restrictions and Employment

## B.E.A. Sales in October

HUNDREDS of employees of the Midlands Electricity Board will have to be dismissed unless the Board is allocated more money to meet its needs. This warning was given last week by Alderman W. Lewis, chairman of the Board, speaking at a meeting of the Midlands Electricity Consultative Council. About another half a million pounds was needed to help to pay for rural development and other schemes, Ald. Lewis told the Council, and if it was not granted economies would have to be made. Last year the Board overspent its capital allocation because it was committed to a large number of schemes. The Board had built up a highly-skilled band of workers in the Area, and it would be distressing if some of them had to be stood off. The Council passed a resolution urging the need for a greater allocation of capital.

### *Southern Consultative Council*

Among topics discussed by the Southern Electricity Consultative Council at its meeting at Reading last week, under the chairmanship of Mr. A. Lockwood, was the supplying of electricity to the Botwell estate, Hayes. On the suggestion of Councillor Shakespeare, it was agreed to ask the Board if, by spreading the cost over a period of years, it would be possible for the scheme to be undertaken. Regarding a scheme for supplying Whitehorn Avenue, Yiewsley, the Council supported a motion by Councillor Parker that the Board should be asked to relax its rule that, under present restrictions on capital expenditure, schemes necessitating h.v. extensions could not be considered where there were gas installations.

On the question of capital contributions by intending consumers, it was thought that local committees should formulate recommendations for consideration by the Council.

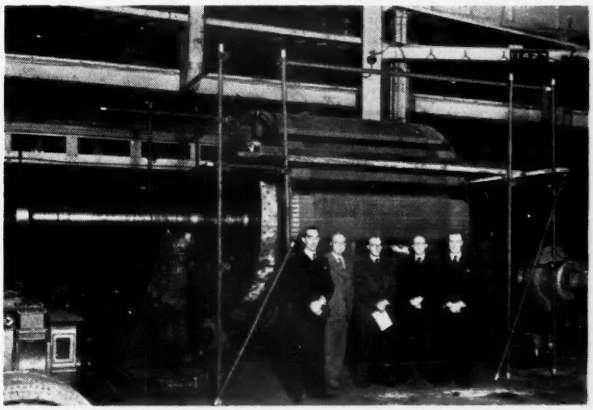
Group Captain Hay mentioned a case in which the Ministry of Transport had refused approval of a street lighting scheme costing £1,500 and it was decided to ask the Board to approach the Ministry in the matter.

Mr. Hyman, reporting a case of a letter to a newspaper which appeared to contain an inaccurate statement affecting the Board, moved, and it was agreed, that the Board should be asked to nominate officers to watch for and rebut any such incorrect statements appearing in the Press.

### *Plant for Norwegian Station*

Aura power station, at Sunndalsfjord on the west coast of Norway near Kristiansund, is now on the way to completion. The civil engineering work was started before 1914 but the outbreak of war stopped it, and between the wars it was not re-started. During the last war the Germans occupying Norway decided to complete the station but the Norwegians were not at all helpful and operations were suspended about 1943. The station is underground, two large halls being blasted out of the solid rock beneath a mountain of 3,600ft. Access is by two tunnels each about 300 yards long. The first two 37,500 kVA, 500 r.p.m. horizontal 10,500 V

**Dr. Vogt with Metrovick officials beside the rotor of one of the 37,500 kVA generators being constructed for Aura power station, Norway**



waterwheel generators are nearing completion at the Trafford Park works of the Metropolitan-Vickers Electrical Co., Ltd., where two similar generators and two of 62,500 kVA at 428 r.p.m. for the same station are now under construction. Progress on these machines was inspected on 20th November by Dr. Fredrik Vogt, managing director of the Norges Vassdrags og Elektrisitetsvesen, which is building and will operate the power station. The power will feed More and Romsdal about 25 miles away and Troendelagen about 100 miles, and will also be used for an aluminium works which is to be built at Sunndalsrora in the vicinity of the station. The water turbines (Pelton-wheel type) are being supplied by Escher Wyss, and apart from the six Metrovick generators, a seventh generator, of 62,500 kVA, is being supplied by the General Electric Co., Ltd.

## *Gas Council Criticizes Electricity Tariff*

Criticism of the new two-part tariff of the South Wales Electricity Board was levied by members of the Wales Gas Consultative Council at Newport, Mon, last week-end. The chairman of the Council, Alderman F. Hamer, said there was a great deal of dissatisfaction amongst gas consumers over the new electricity tariff. "It is none of our concern," he said, "except that it does affect the gas consumer because he cannot use up ten units a room on lighting and has therefore to use other electrical appliances in preference to gas appliances in order to become entitled to the cheaper rate. It acts as a deterrent to the gas industry and places the gas consumers in an unfair position. It is a case of 'Hobson's choice' because they cannot afford both gas and electricity."

## *Brighton "B" Nearly Ready*

The British Electricity Authority states that the first section of the Brighton "B" generating station will be in commission by the end of this year. The first of nearly 5,000 reinforced concrete piles for the foundations of the station was driven by the Mayor of Brighton on 25th November, 1947. The four 52,500 kW turbo-alternators being installed under the present programme will be of the Richardson Westgarth-Brown Boveri three-cylinder combined impulse reaction type, with twin shell condensers, operating at 900 lb/sq in and 900 deg F.

## *Yarmouth Site Purchase*

Great Yarmouth Corporation has agreed to accept an offer of £12,000 by the British Electricity Authority for the purchase of approximately 13 acres on the South Denes for the proposed new generating station. This sum is intended to cover any possible claim by the Council for injurious effects. The Authority stated that it would not require the site during next summer and was prepared to let it to the Corporation. It also suggested that there was a possibility that part of the site might be available for the summer of 1954, although no definite assurance could be given.

**ELECTRICITY SENT OUT BY AREA BOARDS FOR THEIR CONSUMERS**

| Area Board | Totals for October | | | Cumulative totals for seven months April-October | | | Totals for 12 months ended 31st October | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1951 Mill. kWh | 1952 Mill. kWh | Inc. or Dec. % | 1951 Mill. kWh | 1952 Mill. kWh | Inc. or Dec. % | 1951 Mill. kWh | 1952 Mill. kWh | Inc. or Dec. % |
| London | 462·9 | 484·9 | + 4·8 | 2,632·6 | 2,610·7 | − 0·8 | 5,323·5 | 5,277·7 | − 0·9 |
| South Eastern | 261·7 | 273·1 | + 4·4 | 1,522·2 | 1,554·6 | + 2·1 | 2,967·1 | 3,047·2 | + 2·7 |
| Southern | 300·5 | 325·4 | + 8·3 | 1,743·4 | 1,836·6 | + 5·3 | 3,357·5 | 3,542·5 | + 5·5 |
| South Western | 143·3 | 154·9 | + 8·1 | 872·8 | 897·4 | + 2·8 | 1,686·7 | 1,712·6 | + 1·5 |
| Eastern | 429·2 | 453·8 | + 5·7 | 2,513·9 | 2,558·2 | + 1·8 | 4,852·4 | 4,945·3 | + 1·9 |
| East Midlands* | 371·8 | 394·3 | + 6·1 | 2,240·0 | 2,254·1 | + 0·6 | 4,196·0 | 4,253·5 | + 1·4 |
| Midlands* | 510·9 | 538·4 | + 5·4 | 3,024·0 | 3,072·0 | + 1·6 | 5,696·7 | 5,824·6 | + 2·2 |
| South Wales* | 278·0 | 286·0 | + 2·9 | 1,736·2 | 1,833·0 | + 5·6 | 3,015·0 | 3,235·8 | + 7·3 |
| Merseyside and N. Wales* | 298·9 | 289·8 | − 3·0 | 1,875·9 | 1,768·5 | − 5·7 | 3,483·0 | 3,360·6 | − 3·5 |
| Yorkshire* | 482·3 | 524·7 | + 8·8 | 2,949·2 | 3,040·6 | + 3·1 | 5,483·4 | 5,638·4 | + 2·8 |
| North Eastern* | 310·5 | 313·5 | + 1·0 | 1,926·5 | 1,864·2 | − 3·2 | 3,505·0 | 3,479·6 | − 0·7 |
| North Western* | 568·4 | 564·0 | − 0·8 | 3,455·9 | 3,278·7 | − 5·1 | 6,342·6 | 6,302·4 | − 0·6 |
| South-East Scotland | 101·1 | 109·4 | + 8·2 | 605·3 | 627·3 | + 3·6 | 1,166·5 | 1,211·2 | + 3·8 |
| South-West Scotland* | 248·5 | 268·3 | + 8·0 | 1,478·4 | 1,493·8 | + 1·0 | 2,866·9 | 2,912·9 | + 1·6 |
| Totals all Area Boards | 4,768·0 | 4,980·5 | + 4·5 | 28,576·3 | 28,689·7 | + 0·4 | 53,942·3 | 54,744·3 | + 1·5 |
| Direct Supplies by B.E.A. | 59·4 | 62·9 | + 5·9 | 400·6 | 414·7 | + 3·5 | 704·2 | 723·3 | + 2·7 |
| Grand Total | 4,827·4 | 5,043·4 | + 4·5 | 28,976·9 | 29,104·4 | + 0·4 | 54,646·5 | 55,467·6 | + 1·5 |
| Mainly Industrial Areas* | 3,069·3 | 3,179·0 | + 3·6 | 18,686·1 | 18,604·9 | − 0·4 | 34,588·6 | 35,007·8 | + 1·2 |
| Mainly Non-Industrial Areas | 1,698·7 | 1,801·5 | + 6·1 | 9,890·2 | 10,084·8 | + 2·0 | 19,353·7 | 19,736·5 | + 2·0 |
| Total Number of Working Days | 28·7 | 28·7 | | 195·5 | 194·2 | | | | |

** Over half the total sales by the Boards in 1951–52 was to industrial consumers.

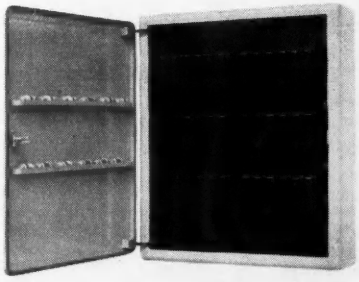
# Industrial Control Gear

## New English Electric Products to be Exhibited

TWO of the latest products of the English Electric Co., Ltd., will receive prominence in a series of exhibitions which the company is organizing in large industrial centres. The two units in question are the "Superform" fuseboard and the "Combination" fuse-switch contactor. The exhibitions will be at Newcastle, Glasgow, Sheffield and Manchester. The Newcastle exhibition is to be held at the Station Hotel on 3rd and 4th December, and the Glasgow exhibition at the Central Hotel on 14th and 15th January. Details of the others will be announced later.

The "Superform" fuseboard is a streamlined metalclad unit, arranged for either surface or flush mounting. The ratings available are 15 A, 30 A and 60 A, up to twelve ways for double-pole, triple-pole and triple-pole and neutral. English Electric h.r.c. cartridge fuse links, carrying A.S.T.A. certification of rupturing capacity to B.S. 88 : 1947 are incorporated.

Designed to eliminate ingress of dust and moisture, the hinged cover is of rigid construction, with self-locking and "finger touch" opening devices. Additionally, a cylinder lock and key can be provided. Distinctive features include ready access for quick removal and replacement of the fuse parts and ample space for rapid connection of couples. Phase barriers are provided and complete safety is achieved by shrouding against internal access. Spare h.r.c. cartridge fuse links are carried on shelves across the inside of the door.

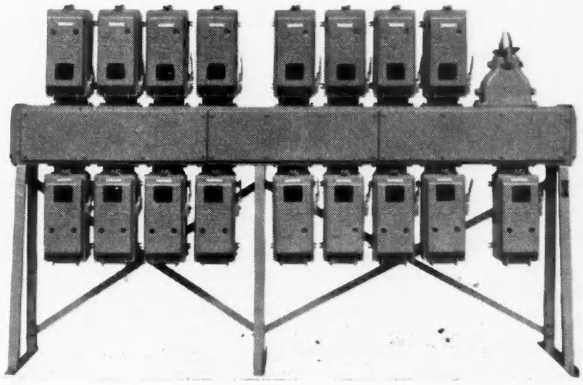


**Interior view of 15 A double-pole "Superform"**

The "Combination" fuse-switch contactors are for the direct-on-line starting of three-phase 400/440 V motors. There are two sizes, one for motors of up to 7·5 h.p. and the other for machines ranging from 7·5 h.p. to 15 h.p. Each unit is metalclad and dustproof, "T" type h.r.c. cartridge fuse links and fully shrouded contacts being incorporated.

The contactor unit is equipped with three overload coils with oil-pot time lags and local stop/start buttons are fitted in the hinged cover. These units are designed for both individual mounting and direct flange mounting on a busbar chamber for group motor control.

**"Combination" fuse-switch contactor board**



# FINANCIAL SECTION

## Company Notes and Stock Exchange Activities

### Reports and Dividends

**Crompton Parkinson, Ltd.**—The financial results of this company for the year ended 30th June last were published in our issue of 7th November. In his circulated statement Mr. Albert Parkinson (chairman and joint managing director) says that the year under review has witnessed an increase in production costs, and competition, particularly in overseas markets, has been intensified. The resulting tendency to reduced profit margin has been offset by record figures of production and sales and by a continuation of their policy of maintaining their various works in a state of high production efficiency. In the latter part of the year there was some recession in demand for their lighter products, but the majority of their manufactures continued to be in strong demand and customers' requirements are still in excess of their productive capacity. There have been many difficulties in their export trade. Import and currency restrictions have led to the curtailment of valuable markets, in particular, Australia and New Zealand. Nevertheless they have been able to increase the value of their direct exports by nearly 30 per cent as compared with the previous year, and indirect exports have also increased considerably. They are conscious of the policy of other countries to extend their own manufacturing resources, and they have met this tendency by an expansion of their manufacturing facilities overseas. The factory for the manufacture of a.c. motors which has been erected in South Africa in partnership with Lancashire Dynamo Holdings, Ltd., in now in production. During the past financial year the technical resources at the works, both as regards staff and equipment, have been further increased, and the main Development and Research Department at Chelmsford is steadily increasing its services.

Referring to the company's schemes for training for management, Mr. Parkinson says that the junior board is now a well-established part of the training schemes. Recently they have set up two new schemes. One provides for the selection of young men for special " on-the-job " training, and the other is a more general scheme of training in the problems attached to particular products, given in each case by the appointment of selected persons to a special committee which is encouraged to discuss and make recommendations concerning that product, its development, manufacture and sale.

**Enfield Cables, Ltd.**—The interim unaudited accounts for the first six months to 30th June last indicate that the group profit, before taxation and provision for intangible assets of subsidiary companies, amounted to approximately £192,000 for the half-year, as compared with approximately £72,000 for the year to 31st December, 1951. In the accounts to 30th June, 1952, provision of £136,000 has been made for losses on the Brynmawr business for the half-year and credit of £28,000 has been taken for exceptional profit. In view of the uncertainties at Brynmawr and the need to build up the financial resources of the group, the board has decided to restrict the interim dividend to 4.8d per stock unit (2 per cent). For the previous year the interim dividend was 9d (3¾ per cent), on £1 million capital, followed by a similar amount on the present £1.4 million capital. A substantial reorganization of the Brynmawr Rubber business is in hand. Copper is now more freely available and, to satisfy orders on hand, the cable factories are at present operating at a high level of output.

The directors state that Peat, Marwick, Mitchell & Co. have submitted their report and this will be circulated after it has been discussed by the board and the stockholders' committee.

**The Ebonite Container Co., Ltd.**, reports a group profit for the year to 31st March last of £221,615, as compared with £230,203 for the previous year, and after deducting £117,000 for taxation, a net profit of £77,945 (against £97,871). The dividend for the year is unchanged at 17½ per cent.

**Burco, Ltd.**, is holding its annual meeting on 10th December. In his circulated statement Mr. D. K. Ward (chairman and managing director) says that although the results of the year under review were good it should not be assumed that trading activity has been maintained evenly throughout the period. They began the financial year with a volume of orders that would have kept them in full production for two years. By the early summer it was evident that the buying rush had finished and retailers were not clearing stocks, and to accommodate customers they accepted cancellation of orders. The export of washing machines to Australia which began promisingly has ceased, and export to other countries is difficult. The time is approaching when Electricity Boards will be compelled to urge the use of electricity in the domestic field. The cessation of power cuts, the restoration of hire

purchase facilities, and a rational purchase tax policy, would lead to an expansion in their industry.

**Thorn Electrical Industries, Ltd.**—The issue of £500,000 of 5½ per cent unsecured loan stock is being made at par to all classes of shareholders. The proceeds of the issue will be applied to the expansion of fluorescent lighting production, financing radar developments and Government contracts.

**Peto-Scott Electrical Instruments, Ltd.**, report a profit for the year to 30th June last of £19,861, as compared with £20,421 for the preceding fifteen months. After deducting £10,547 for taxation, it is proposed to pay a dividend of 12½ per cent for the year on doubled capital. The dividend for the previous period was also 12½ per cent. The balance carried forward is £12,542 (against £3,894 brought in).

**The Plessey Co., Ltd.**, reports a group trading profit of £819,222 for the year ended 30th June last, as compared with £637,474 for the preceding year. After making various adjustments, the total profit available is £844,978, and after providing £610,783 for taxation, the group net profit is £234,190 (against £204,522). Group reserve receives £104,000 and it is proposed to pay a final ordinary dividend of 12½ per cent, making 25 per cent for the year (against 22½ per cent). The balance carried forward is £290,143 (against £219,436 brought in).

The **Hackbridge & Hewittic Electric Co., Ltd.**, is paying an interim dividend of 5 per cent actual (same) on the ordinary stock.

**Glenfield & Kennedy, Ltd.**, have declared an interim dividend of 5 per cent (unchanged).

**Richard Johnson & Nephew, Ltd.**, are paying an interim dividend of 2 per cent on doubled capital (against 4 per cent).

**The General Cable Manufacturing Co., Ltd.**, has announced a second interim dividend of 18 per cent (unchanged) on increased capital.

## New Companies

**Barber Switchgear Co., Ltd.**—Registered 1st November. Capital £5,000. To acquire the business of electrical switchgear manufacturers carried on by Blanche I. Barber, H. N. Barber and Blanche M. Bishop as Barber Switchgear Co., at Electrical Works, Holliday Street, Birmingham. Directors : Mrs. B. I. Barber, H. N. Barber and Mrs. Blanche M. Bishop. Regd. office : Electrical Works, Holliday Street, Birmingham, 1.

**Micox Electric Tools, Ltd.**—Registered 17th October. Capital £500. Manufacturers of and dealers in electrical machines, motors, machinery, plant, apparatus, tools, etc., and to acquire certain assets and liabilities of Micox Electrical Equipment, Ltd. Directors : R. G. Lacey (chairman), I. M. Lacey and S. J. Carter. Solicitors : Nash Field & Co., Farleigh House, Lawrence Lane, E.C.2.

**Countertubes, Ltd.**—Registered 3rd November. Capital £100. Research workers, manufacturers of and dealers in electronic devices, radio valves and apparatus, ionisation chambers, geiger counters, cathode ray tubes, photo-electric cells and scientific apparatus, etc. Directors : G. A. R. Tomes, S. A. Reed, A. J. Tomes and F. Spencer. Regd. office : Dunbar Works, Dunbar Street, W. Norwood, S.E.27.

**Hartons Installations, Ltd.**—Registered 27th September. Capital £10,000. Electrical engineers and contractors, etc. Directors : A. J. Matthews and F. W. S. Horu. Regd. office : 35, Bagshot Street, S.E.17.

**Achievement Scintillating Signs, Ltd.**—Registered 23rd October. Capital £100. Electrical sign makers, sign writers, etc. Directors : D. A. Dalgleish and Mrs. S. Dalgleish. Secretary : Sarah Dalgleish. Regd. office : 235, Manningham Lane, Bradford.

**W. R. Boot & Son, Ltd.**—Registered 24th October. Capital £1,000. Electrical engineers and contractors, manufacturers, importers and exporters of and dealers in wireless apparatus, etc. Directors : W. R. Boot and Mrs. Joan C. Boot. Regd. office : 50, St. Peter's Avenue, Cleethorpes, Lincs.

**J. Arthur Moss (Electrical), Ltd.**—Registered 25th October. Capital £1,000. Electrical installation contractors, electrical contracting and advisory engineers, mechanical, radio and television engineers, etc. Directors : J. A. Moss and Mrs. May A. H. Moss. Solicitors : R. C. Bartlett & Co., 27, John Street, W.C.1.

**Curtis E. Ballin & Son, Ltd.**—Registered 28th October. Capital £1,000. Electrical engineers and consultants, electrical wiring and installation contractors, manufacturers of and dealers in electrical and radio apparatus of all kinds, etc. Directors : C. E. Ballin and Mrs. E. M. Ballin. Secretary : Evelyn M. Ballin. Regd. office : 200, Studfall Avenue, Corby, Northants.

## Bankruptcies

**L. J. Quick**, 2, The Mall, Ealing, London, W.5, electrical distributor.—Trustee, Mr. R. A. Rodgers, 25, Bedford Row, London, W.C.1, appointed 13th November.

**J. Hilbert**, 17, Manchester Road, Haslingden, Rossendale, Lancs, radio and electrical engineer.—Last day for receiving proofs for dividend 5th December. Trustee, Mr. A. T. Eaves, 47, Mosley Street, Manchester, 2.

**R. Williams**, electrical engineer, 33a, Beech Road, Higher Tranmere, Birkenhead.—Receiving order made 12th November on a creditor's petition.

# STOCKS and SHARES

ANOTHER quiet week's business in the Stock Exchange has left little change in either gilt-edged securities or the leading industrial investments. Pockets of activity developed here and there, the most spectacular being a further spurt in Japanese bonds, with Tokyo Electrics again well to the fore with a rise to 192. Radio shares took a decided turn for the better on encouraging news from the trade, particularly so far as television sales were concerned. Cossors are 1s 9d to the good at 10s 3d. E. K. Cole and E.M.I. shares also improved, but Pye were restrained by the imminence of a capital issue. Plessey at 20s 9d are unchanged : the dividend of 25 per cent is 2½ per cent up. Elsewhere, Scottish Cables are higher at 11s 3d in response to the larger amount of the interim dividend, and Switchgear & Cowans, 1s up at 14s, appear to be throwing off the effects of the issue of shares now in progress. Aerialites at 8s 6d were very firm on the maintained dividend, and in advance of the annual results.

## Enfield Cables Recovery

Although regarded as very satisfactory, the interim trading report issued by Enfield Cables, covering the first six months of the current year, produced no material change in the price of the company's £1 ordinary shares at 22s. Group earnings for the half year, subject to audit and before taxation and certain provisions, are given as £192,000, which compares with a surplus of only £72,000 for the whole of 1951, and is roughly at the same annual rate as for 1950. A better supply of copper appears to have made the main contribution to the recovery. An auditors' report on the previous position has been completed, and is to be circulated to all stockholders. Meanwhile, the interim dividend for the present year is being reduced from 3¾ to 2 per cent in order to conserve resources, and in view of uncertainties about the Brynmawr Rubber subsidiary.

## Metal Industries Finance

Metal Industries £1 shares hardened to 39s 6d upon news that the company had completed arrangements to meet current cash requirements by the sale, at a profit, of part of its large holding of British Oxygen ordinary stock. For some time previously, the shares had been affected by uncertainty about the method which would be adopted to meet the need for more working capital apparent in the last balance-sheet. The operation will still leave the company holding £1½ million of British Oxygen stock. Metal Industries' latest dividend of 15 per cent would be equivalent to 12 per cent on the present capital, as increased subsequently by a one-for-four bonus. At that rate, the prospective yield on the shares is £6 2s 0d per cent.

## African Cables

Comment was made here last week upon the dividend, and other details were given, of the Aberdare Cables, Africa, Ltd. In case any misunderstanding should have arisen, it may be stated that African Cables—this title headed the paragraph—is another, quite separate, company very well known in the industry at home and in South Africa under that name. African Cables, Ltd., originally known as African Cables (Pty.), Ltd., has been manufacturing electric cables in South Africa since 1936, whereas Aberdare Cables, Africa, Ltd., as was pointed out here last week, was formed six years ago under Sir George Usher's direction. There is no London market in African Cables, Ltd., shares. In Johannesburg, the £1 shares are quoted at about 67s 6d.

## Company News

Crompton Parkinson's full report confirms the expansion of about 15 per cent in the trading surplus for the year ended last June. Credit is given largely to a record production performance, which offset the effects of increased costs and competition. The balance sheet shows that the rise of some £2½ million in the figures for stocks, work in hand and debtors has resulted in a large growth of the overdraft which, with acceptance credits, now exceeds £2¾ million, but the company still considers it undesirable to replace this with fresh permanent capital while so much uncertainty persists over future turnover and requirements. The chairman of Ferranti, Ltd., is also able to give a satisfactory account of the past year's progress and of current activity. The company has a similar problem in the matter of working capital. Borrowing powers are being increased, and there is no sign yet of any intention to introduce the ordinary shares to the public.

## Miscellaneous Matters

Oldham & Son doubled their ordinary capital (amounting now to £400,000) by a share-for-share capital bonus during the current year, so that the 7½ per cent interim dividend now declared is equivalent in money to last year's corresponding payment of 15 per cent. Assuming a reduction of the final dividend rate in the same proportion, the total will be 17½ per cent, and the yield on the 1s shares, at 2s 6d, around 7 per cent. Christy Bros. have announced that shareholders have taken up all the 50,000 £1 shares offered to them at par, which is about their present market price. For the last year the company paid 7 per cent, of which 1 per cent was regarded as a deferred payment for the previous year.

# ELECTRICAL INVESTMENTS

## *Past Week's Price Changes*

| Company | Dividend Previous | Dividend Last | Middle Price 24th Nov. 1952 | Week's Rise or Fall | Est. Yield p.c. £ s d |
|---|---|---|---|---|---|
| *Gilt-edged and Overseas Stocks* | | | | | |
| Brit. Elec. 1968/73 | 3 | 3 | 84½ | — | 3 11 0 |
| Brit. Elec. 1974/77 | 3 | 3 | 83½ | +½ | 3 11 10 |
| Brit. Elec. 1976/79 | 3½ | 3½ | 89 | −½ | 3 18 8 |
| Brit. Elec. 1974/79 | — | 4½ | 100 | — | 4 5 8 |
| Calcutta Elec. .. | 6† | 6† | 20/6 | — | 5 17 1† |
| East African Power | 7 | 7 | 23/- | — | 6 1 9 |
| Nigerian Elec. .. | 10 | 10 | 21/3 | — | — |
| Palestine Elec. "A" | 5† | Nil | 11/6 | — | — |
| Perak Hydro-Elec. | Nil | Nil | 15/- | — | Nil |
| *Equipment and Manufacturing* | | | | | |
| AberdareCables(5/-) | 20 | 20 | 14/- | — | 7 2 10 |
| Aerialite (1/-) .. | 83½ | 88½ | 8/6 | +6d | 10 7 9 |
| Allen, W. H. .. | 15 | 15 | 41/9 | — | — |
| Aron Elec. Ord. .. | 15 | 15 | 33/9 | — | 8 17 9 |
| Assoc. Elec. Ord. .. | 20 | 20 | 72/6 | — | 5 10 6 |
| Automatic Tel. & El. | 15 | 15 | 57/6 | +6d | 5 4 2 |
| Babcock & Wilcox | 18 | 18 | 68/- | +1/- | 5 6 0 |
| Baldwin, H. J. (2/-) | 25 | 20 | 3/6 | — | 11 8 9 |
| Bakelite (10/-) .. | — | — | 17/6 | — | — |
| British Aluminium | 10 | 12 | 43/3 | — | 5 11 0 |
| B.I. Callender's .. | 7½ | 9 | 33/- | — | 5 9 1 |
| British Thermostat (5/-) .. .. | 30 | 30 | 27/- | — | 5 11 1 |
| British Vac. Cleaner (5/-) .. .. | 25 | 25 | 13/- | — | 9 12 4 |
| Brook Motors (10/-) | 20 | 20 | 28/9 | — | 6 19 2 |
| Brush Ord. (5/-) .. | 10 | 10 | 5/- | — | 10 0 0 |
| A. F. Bulgin (1/-) .. | 27½ | 30 | 2/6 | — | 12 0 0 |
| Burco (5/-) .. | 38½ | 35 | 19/6 | — | 8 19 6 |
| Chloride El. Storage | 15 | 15 | 61/3 | — | 4 18 0 |
| Cole, E. K. (5/-) .. | 25 | 25* | 16/3 | +9d | 7 13 10 |
| Cossor, A. C. (5/-) | Nil | 10 | 10/3 | +1/9 | 4 17 7 |
| Crabtree (10/-) .. | 17½ | 17½ | 32/6 | — | 5 7 8 |
| Crompton Parkinson Ord. (5/-) .. | 11½ | 11½ | 9/- | — | 6 5 0 |
| De La Rue (5/-) .. | 50 | 35* | 8/9 | +3d | — |
| Decca (1/-) .. | 112½ | 112½ | 17/3 | — | 6 10 9 |
| Dewhurst (2/-) .. | 35 | 22½* | 5/- | — | — |
| Dictograph Tel.(2/-) | 20 | 20 | 5/- | — | 8 0 0 |
| E.M.I. (10/-) .. | 12 | 12 | 15/- | +3d | 8 0 0 |
| Electrical Components (5/-) .. | 20 | 20 | 10/- | — | 10 0 0 |
| Elec. Construction | 15 | 15 | 50/- | — | 6 0 0 |
| Enfield Cable Ord. | 7½ | 7½ | 22/- | — | 6 16 4 |
| English Electric .. | 15 | 15 | 55/6 | — | 5 8 1 |
| Ericsson Tel. (5/-) | 22† | 22*† | 33/- | −6d | 2 16 5† |
| Ever Ready (5/-) .. | 35 | 35 | 26/- | — | 6 14 8 |
| Falk Stadelmann | 15 | 15 | 38/9 | — | 7 14 8 |
| G.E.C. Ord. .. | 22½ | 22½ | 42/6 | — | 5 6 0 |
| General Cables (5/-) | 30 | 30 | 14/6 | — | 10 6 10* |
| Greenwood & Batley | 15 | 15 | 38/- | — | 7 18 0 |
| Hackbridge Cable (5/-) .. .. | 20 | 20 | 10/9 | −6d | 9 6 0 |
| Hackbridge Hewittic (5/-) .. .. | 18 | 20 | 16/3 | — | 6 3 0 |
| Hall Tel. Acc. (10/-) | 10 | 10 | 10/6 | — | 9 10 6 |
| Heatrae (2/-) .. | 12½ | 12½ | 4/- | — | 6 5 0 |
| Henleys (5/-) .. | 20 | 20 | 18/- | −3d | 5 11 0 |
| Hobourne (5/-) .. | 15 | 20* | 11/3 | — | 8 17 10 |
| Hoover (5/-) .. | 37½ | 35* | 23/9 | +1/9 | 7 7 4 |
| *Equipment and Manufacturing (continued)* | | | | | |
| Intl. Combustion (5/-) .. .. | 20 | 25 | 24/3 | +1/9 | 5 3 1 |
| Johnson & Phillips | 15 | 15 | 52/6 | — | 5 14 3 |
| Lancashire Dynamo | 22½ | 12½* | 42/6 | — | 5 17 8 |
| Laurence, Scott (5/-) | 12½ | 15 | 13/3 | +6d | 5 13 3 |
| London Elec. Wire | 10 | 12½ | 49/6 | — | 5 1 0 |
| J. Lucas .. .. | 7½ | 9½ | 34/6 | — | 5 6 3 |
| Marryat & S. (2/-) | 22½ | 22½ | 5/- | — | 9 0 0 |
| Mather & Platt .. | 12½ | 12½ | 42/- | +⅛ | 5 19 0 |
| Metal Industries .. | 10 | 15 | 39/6 | +⅛ | 7 12 0 |
| Mid. Elec. Mfg. .. | 15 | 15 | 53/9 | — | 5 11 6 |
| Murex .. .. | 12½ | 15 | 53/- | — | 5 13 3 |
| Newman Ind. (2/-) | 6 | 10 | 2/3 | — | 8 17 10 |
| Oldham & Son (1/-) | 30 | 35 | 2/6 | — | — |
| Parnall (Yate) (5/-) | 6 | 6 | 4/3 | — | 7 1 3 |
| Parsons, C. A. .. | 15 | 10* | 53/9 | — | — |
| Plessey (5/-) .. | 22½ | 25 | 20/9 | — | 6 0 6 |
| Pye Deferred (5/-) | 18 | 18 | 15/- | −3d | 6 0 0 |
| Revo (10/-) .. | 27½ | 27½ | 42/6 | — | 6 9 6 |
| Reyrolle .. .. | 15 | 10* | 47/6 | — | — |
| Scot. Cable (4/-) .. | 30 | 32 | 11/3 | +6d | — |
| Siemens Ord. .. | 10 | 10 | 34/- | — | 5 17 8 |
| Strand Elec. (5/-) .. | 17½ | 17½ | 8/9 | — | 10 0 0 |
| Sturtevant (5/-) .. | 16½† | 17½*† | 22/6 | — | — |
| Switchgear & Cowans (5/-) .. .. | 22½ | 22½ | 14/- | +1/- | 8 0 9 |
| Taylor T. (5/-) .. | 20 | 20 | 20/- | — | 5 0 0 |
| T.C.C. (10/-) .. | 20 | 20* | 37/6 | — | — |
| T.C. & M. .. .. | 10 | 10 | 25/6 | — | — |
| Telephone Mfg. (5/-) | 10 | 10 | 8/- | — | — |
| Thorn Elec. (5/-) .. | 10 | 12½ | 8/- | — | 7 10 3 |
| Tube Investments | 25 | 15* | 55/9 | — | 5 7 6 |
| Vactric (5/-) .. | Nil | Nil | 5/- | — | Nil |
| Veritys (5/-) .. | Nil | 7½ | 4/9 | — | 7 18 0 |
| Walsall Conduits (4/-) .. .. | 70 | 70 | 45/6 | +6d | — |
| Ward & Goldstone (5/-) .. .. | 45 | 45* | 30/9 | — | — |
| Watford (2/-) .. | 25 | 25 | 6/- | −3d | 8 6 8 |
| Westinghouse Brake | 14 | 14 | 50/- | +⅛ | 5 12 0 |
| West, Allen (5/-) .. | 12½ | 15 | 10/3 | — | 7 6 4 |
| *Trusts, Transport and Communications* | | | | | |
| Anglo-Am. Tel.: A Ord. .. .. | — | 6 | 79½ | — | 7 11 0 |
| Ord. .. .. | — | 3½ | 55 | — | 6 16 3 |
| Anglo-Portuguese | 8 | 8 | 20/6 | — | 7 16 1 |
| Brit. Elec. Traction: Def. Ord. .. | 22½ | 25 | 425 | — | 5 17 8 |
| Cable & Wireless: Ord. .. .. | 6 | 8 | 122½ | — | 6 10 8 |
| 4% Loan .. | 4 | 4 | 98½ | — | 4 1 3 |
| Calcutta Trams .. | 6† | 6† | 20/6 | — | 5 17 1† |
| Cape Elec. Trams | 5 | 5½ | 10/- | — | 11 0 0 |
| Marconi Marine .. | 10 | 10 | 30/6 | — | 6 11 3 |
| Oriental Tel. Ord. | 16 | 16 | 57/6 | — | — |
| Telephone Props. .. | 8 | 8 | 33/9 | −⅛ | 4 14 9 |
| Tele. Rentals (5/-) | 10 | 10 | 8/6 | −6d | 5 17 9 |

* After capital bonus.
† Dividends are paid free of Income Tax.

# RECENT INTRODUCTIONS

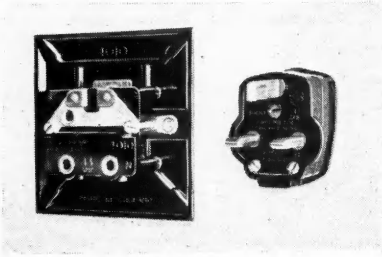
*Notes on New Electrical and Allied Products*

## Improved Geiger Müller Tube

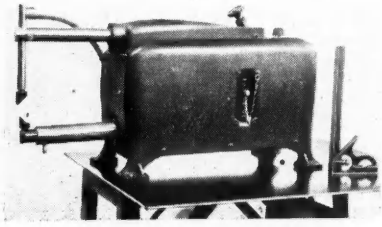
LONGER life, larger pulse amplitude and lower operating voltage are the main features of the new Geiger M ller tubes recently brought out by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. They have been made on a pre-production scale and are available at short notice. Similar in size and window weight to the existing "GM.4" tube, and with an operating voltage of about 450 V, the 25B7H uses a bromine quenching agent so that it is known as a halogen quenched type of tube. Other types of halogen quenched tubes will be available in the future.

## Fused Plug and Socket

Three-pin 13 A fused plugs and shuttered socket outlets are now being made by GEO. BECKER, LTD., Ampere Works, Northend Road, Wembley Park, Middlesex. Apart from satisfying all the requirements of B.S. 1363 these accessories incorporate a number of additional refinements. For example, the shutter "fails safe" while the plug incorporates a spare fuse.



**Rear view of the Becker 13 A shuttered socket outlet and fused plug**



**Vick bench type spot welding machine**

## Toaster in Colours

The "Clem" toaster, manufactured by A.B. METAL PRODUCTS, LTD., Ynysboeth, Abercynon, Glam., is now available again in cream, eau-de-nil or blue, with chromium plated doors.

## Bench Type Spot Welder

A bench type spot welder has recently been put on the market by W. D. VICK, LTD., Station Road, Acocks Green, Birmingham, 27, for use where the outlay for the larger and more costly type of machine is not warranted. It can be used for a wide variety of work from the welding of small assemblies as in radio work to more arduous duties such as joining two 14 s.w.g. sheets. Essentially the machine comprises a 4 kVA double-wound transformer, the ends of the secondary winding being bolted direct to the electrode arms.

The welding head incorporates a spring controlled toggle lever which exerts a constant, but adjustable, welding pressure at the electrode tips. Means are also provided of varying the welding time from 0·1 to 3 sec. Although the machine uses mains water for cooling the welding arms, a self-contained cooling tank and circulating pump can be supplied if required. The complete machine is robustly constructed and is normally supplied to operate from 400/440 V single-phase mains, but intermediate tappings can be provided to order.

## Coal-face Lighting Fitting

In its new coal-face flameproof lighting fitting, the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, has succeeded in combining portability with low surface brightness from a tungsten light source. The fitting, which incorporates a 60 W "Osram" lamp, is made fully flameproof by using a thick armour-plate front glass while an additional domed front cover of high transmission opal "Perspex" affords extra mechanical protection. The resulting maximum brightness is much less than that of a fluorescent tube.

These fittings are smaller, cheaper and lighter than fluorescent fittings which are recommended for roadways and pit bottoms where the installation is of a more permanent nature. Supplied complete with two flameproof half-couplers

integral with the unit, the fittings are normally spaced at about five or six yards.

## All-White Cooker

To satisfy the demand from many housewives whose tastes in interior decoration favour brightly contrasting colours against a background of white, the GENERAL ELECTRIC CO., LTD., is now making its "DC 114" cooker available in white vitreous enamel. Hitherto this finish has been applied to models for export only, the colours on the home market being restricted to two-tone ivory, and cream and green. The company is also producing a cooker with a white body and a black hob. There is no extra charge for cookers with these new finishes.

## Electric Actuator for Aircraft

The two-speed electrically operated linear actuator, developed by the ENGLISH ELECTRIC CO., LTD., Queen's House, London, W.C.2, is capable of operating over a temperature range of minus 75 deg C to plus 90 deg C. Two identical motors provide power for the high and low speed drives respectively, each driving through differentially-arranged gear trains, whose rotary motion is finally translated into linear motion by a non-reversible Acme nut and screw. The advantage of having two separate motors is that two entirely independent sources of supply are provided, making total failure of the unit unlikely. Each motor has an electro-magnetic brake to ensure accurate positioning at any point during the stroke.

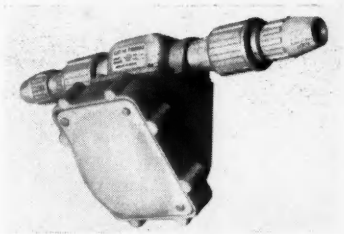
Although the unit weighs only 31 lb loads of up to 8,000 lb can be comfortly dealt with on the high speed drive and up to 16,000 lb on the low speed drive. Built into the actuator is a position indication transmitter for use with a "Desynn" type cockpit instrument. Incorporated in the gearbox is an overload clutch which prevents damage to the actuator in the event of a limit switch failure or other accidental overload.

Integral mechanical stops are fitted, which prevent damage to the aircraft structure if a limit switch fails. The actuator is irreversible and, acting as a strut in the aircraft structure, will withstand an ultimate load greater than 27,000 lb.

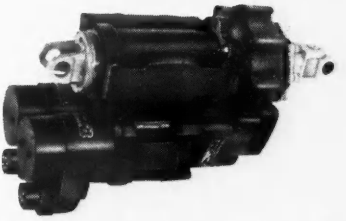
## Staff Locator System

The "Pioneer" staff locator system which has just been made available by COMMUNICATION SYSTEMS, LTD., Strowger House, Arundel Street, London, W.C.2, comprises a series of three-digit indicators which are automatically illuminated upon the operation of a motorized control unit to form codes. Forty codes are possible. The code to be sent is set up by the depression of the appropriate buttons on the control unit, and can be checked by a set of monitor lamps. If required the system can be arranged to provide a short audible warning that a code is being transmitted.

The indicators are finished in permanent crackle gold with aluminium or chromium plated fittings and the three digits "2," "4" and "6" in red "Perspex," are illuminated internally by 14 W sign lamps. The control unit is housed in a crackle black finished metal cabinet, suitable for desk use or mounting on a wall shelf. Each is capable of operating 50 indicators of the three-lamp type, the maximum current drain being 10 A.



G.E.C. flameproof coal-face lighting fittings



Electric actuator for aircraft (English Electric)

"Pioneer" staff locator control unit and (inset) indicator

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 7th January, from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

**1948**

9188. Atherton, A. H., and Watton, W. L.—Circuit arrangements incorporating thermionic valves utilizing secondary-electron emission amplification. 10th March, 1949. (685602.)

18648. Mullard Radio Valve Co., Ltd., and Grimsdell, G. D.—Time-delay circuits, time bases and similar electric circuits. 22nd July, 1949. (685682.)

19449. General Electric Co., Ltd., Dovey, D. M., and Hyde, P. W.—Methods of and apparatus for forming alloy layers on metallic surfaces. 20th July, 1949. (685683.)

24956. Marconi's Wireless Telegraph Co., Ltd., and Brandon, P. S.—Radar systems. 15th August, 1949. (685604.)

31427. Atherton, A. H.—Electron discharge devices employing secondary electron emission, and electrodes for use therein. 23rd November, 1949. (685605.)

**1949**

513. British Thomson-Houston Co., Ltd.—Thermionic cathodes. 7th January, 1949. (685444.)

3985. Philips Electrical, Ltd.—Shaft positioning devices and mechanisms comprising a plurality of such devices. 14th February, 1949. (685688.)

5576. Arvin Electric, Ltd.—Electric dry shavers. 1st March, 1950. (685446.)

16567 Johnson & Phillips, Ltd., and Good, A. J.—Electric cables. 22nd June, 1950. (685532.)

17403. Electric & Musical Industries, Ltd.—Power supply systems for thermionic valve apparatus. 30th June, 1950. (685452.)

18124. Mullard Radio Valve Co., Ltd., and Grimsdell, G. D.—Time-delay circuits, time bases and similar electric circuits. 22nd July, 1949. Cognate application 30709. 26th November, 1948. (685692.)

19015. Air Reduction Co., Inc.—Method of and apparatus for electric fusion welding of overlapping pieces. 19th July, 1949. Cognate application 19016, 22nd September 1948. (685622.)

21234. Marconi's Wireless Telegraph Co., Ltd.—Radar systems. 20th June, 1950. (685625.)

28224. British Federal Welder & Machine Co., Ltd., and Tribe, T. F.—Pressure-operated switch for portable welding machines. 3rd January, 1951. (685535.)

29721. Imperial Chemical Industries, Ltd., Rudge, A. J., and Howell, W. N.—Electrical connections to fluorine cell anodes. 21st November, 1950. (685461.)

**1950**

445. British Messier, Ltd.—Electrically actuated mechanism for controlling fluid-pressure apparatus. 1st November, 1950. (685467.)

4177. Du Mont Laboratories, Inc., A.B.—Cathode-ray oscillograph circuit. 17th February, 1950. (685556.)

7271. English Electric Co., Ltd.—Motor control systems for electrically propelled vehicles. 16th March, 1951. (685473.)

8136. Wolf Electric Tools, Ltd., and Gubbins, C. H.—Electric motors. 31st March, 1950. (685645.)

10300. General Electric Co., Ltd., and Pickering, I. J.—Electrode holders for arc welding. 26th April, 1951. (685476.)

10596. Dunlop Rubber Co., Ltd.—Electrically controlled system for supplying fuel by gaseous pressure. 4th April. 1951. (685565.)

10676. Reyrolle & Co., Ltd., A., and Bayles, J. W.—Control of welding generator. 1st May, 1951. (685714.)

11383. Johnson & Phillips, Ltd., Aldridge, F. J., and Jones, H. S.—Tools for manipulating sheathed electric cables and the like. 8th May, 1951. (685384.)

12515. Marconi's Wireless Telegraph Co., Ltd.—Thermionic valve amplifiers. 4th January, 1951. (685478.)

13764. National Research Development Corporation.—Snap-action electric switches. 17th May, 1951. (685569.)

14113. British Thomson-Houston Co., Ltd.—Deviation compensators. 6th June, 1950. (685480.)

15804. General Electric Co., Ltd., and Biggs, A. J.—Television apparatus. 20th June, 1951. (685483.)

16746. English Electric Co., Ltd.—Electric motor control systems. 29th June, 1951. (685572.)

19354. Metropolitan-Vickers Electrical Co., Ltd.—Electric arc welding. 2nd August, 1950. (685577.)

20851. Stackpole Carbon Co.—Ceramic resistors. 23rd August, 1950. (685727.)

22983. Radio Corporation of America.—Colour television system. 19th September, 1950. (685661.) 23205. Colour television receivers. 21st September, 1951. (685662.) 28790. Colour television system. 24th November, 1950. (685495.)

23811. General Electric Co., Ltd., and Taylor, S.—Insulating bushings. 14th September, 1951. (685663.)

27721. Linde Air Products Co.—Line tractor control electronic drive. 13th November, 1950. (685733.)

28092. Pertrix-Union Ges.—Process for the storage capacity of batteries consisting of bipolar cells. 16th November, 1950. (685401.)

31383. British Thomson-Houston Co., Ltd.—Electric lampholders. 27th December, 1950. (685405.)

**1951**

4409. Reavell, J. A.—Coiled electrical heating elements. 15th May, 1951. (685500.)

5976. Westinghouse Electric International Co.—Stationary electrical induction apparatus. 13th March, 1951. (685416.)

6510. Aktiebolaget Boforos.—Harmonics-compensated electrical device for transmitting angular movements. 13th March, 1951. (685418.)

9685. Akt.-Ges. Brown, Boveri & Cie.—Arrangement for regulating the power medium supply of a power station. 25th April, 1951. (685509.)

12568. British Thomson-Houston Co., Ltd.—Electromagnetic pumps. 29th May, 1951. (685424.)

12907. Union Carbide & Carbon Corporation.—Automatic metal arc welding system. 31st May, 1951. (685513.)

14404. Westinghouse Electric International Co.—Static phase balancers. 18th June, 1951. (685599.)

15558. Liverpool Electric Cable Co., Ltd.—Production of electrically conductive rubber or rubber-like compositions. 30th June, 1951. (685742.)

23848. Landis & Gyr Akt.-Ges.—Remote control transmitter for the injection of control currents into heavy current networks. 12th October, 1951. (685434.)

23978. British Thomson-Houston Co., Ltd.—Coffee makers. 15th October, 1951. (685435.)

24691/2. Felten & Guilleaume Carlswerk Akt.-Ges.—Submarine cable. 23rd October, 1951. (685438/9.)

24706. Philips Electrical Industries, Ltd.—Devices for converting electric pulse code modulation into pulse position modulation. 23rd October, 1951. (685518.)

28489. Wreford, F. S.—Welding cable heads. 7th February, 1950. (685746.)

# NEXT WEEK'S EVENTS

## Monday, 1st December

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. "Colour Television: Some Subjective and Objective Aspects of Colour Rendering," by G. T. Winch. (Joint meeting with Radio Group.)

ILFORD.—Angel Hotel, 8 p.m. A.S.E.E. North East London Branch. "General Installations," by H. W. Quelch.

LIVERPOOL.—Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. Discussion on "The Impact of Television on Sound Broadcasting," opened by G. Parr.

LONDON.—Caxton Hall, S.W.1, 7 p.m. E.P.E.A. London Technical Group. Discussion on "Power Station Troubles."

MAIDSTONE.—"Wig and Gown," 7.30 p.m. I.E.E. district meeting. "Some Aspects of the Oil Refining Industry," by F. A. Maliphant.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Harmonic Response Testing Apparatus for Linear Systems," by D. O. Burns and C. W. Cooper.

NORWICH.—Royal Hotel, 7.30 p.m. I.E.E. district meeting. "275 kV Developments on the British Grid System," by D. P. Sayers, Dr. J. S. Forrest and F. J. Lane.

READING.—3–5, Market Place, 7 p.m. I.E.E. district meeting. Informal talk on "275 kV Developments on the British Grid System," by F. J. Lane.

## Tuesday, 2nd December

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 7.15 p.m. Incorporated Plant Engineers, South Wales Branch. "Mechanical Handling Problems."

CHELMSFORD.—Public Library, 7 p.m. I.E.E. London Students' Section. District meeting. Discussion evening.

COVENTRY.—Technical College, 7.30 p.m. Institution of Engineering Inspection, Coventry Branch. "Marine Radar" (with film), by M. J. Millane.

ELTHAM.—Congregational Church Hall, Court Road, 8 p.m. A.S.E.E. South East London Branch. "The Camera in Industry."

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "An Account of, and Discussion on, the C.I.G.R.E. Conference, Paris 1952," by A. S. Husbands and W. L. Kidd.

HAMMERSMITH.—Windsor Castle Hotel, 154, King Street, 7.30 p.m. A.S.E.E. West London Branch. "Ductube System in Structures."

HUDDERSFIELD.—Training College, Queen Street South, 6.30 p.m. I.E.E. North Midland Centre. Education Discussion Circle. Discussion on "Technique of Teaching," opened by A. MacLennan.

HULL.—Y.E.B., Ferensway, 7.15 p.m. I.E.E. North Midland Centre. District meeting. "The Protection of Electrical Power Systems—A Critical Review of Present-Day Practice and Recent Progress," by H. Leyburn and C. H. W. Lackey.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. Discussion on "Recording Instruments," opened by W. Bamford.

MANCHESTER.—Engineers' Club, 17, Albert Square, 6.30 p.m. I.E.E. North-Western Centre. "Electronic Telephone Exchanges," by T. H. Flowers.

NOTTINGHAM.—Demonstration Theatre, E.M.E.B., Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "Power Factor Correction," by G. Knights.

## Wednesday, 3rd December

BIRMINGHAM.—Chamber of Commerce, New Street, 7.30 p.m. Institution of Engineering Inspection, Birmingham Branch. "The Application of Electronics in Inspection Methods," by J. R. Cornelius.

COVENTRY.—G.E.C. Telephone Works, 7 p.m. I.E.E. South Midland Students' Section. "Electronic Simulators," by J. B. Gopsill.

EDINBURGH.—Heriot-Watt College, 7 p.m. I.E.E. South-East Scotland Sub-Centre. "The Electrolytic Analogue in the Design of High-Voltage Power Transformers," by D. McDonald.

357, High Street, 7 p.m. I.E.S. Edinburgh Centre. "Vision and Illumination," by A. Mellick.

INVERNESS.—Caledonian Hotel, 7.30 p.m. I.E.E. North Scotland Sub-Centre. District meeting. Chairman's Address, by L. B. Perkins.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "A Survey of Present Knowledge of Thermionic Emitters," by D. A. Wright.

I.E.E. London Students' Section. 2.15 p.m. Visit to E.R.A. Laboratories, Greenford.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 6 p.m. Institution of Heating and Ventilating Engineers. "School Heating Research," by Dr. J. C. Weston.

MIDDLESBROUGH.—Cleveland Scientific and Technical Institute, 6.30 p.m. I.E.E. Tees-Side Sub-Centre. "Post-Graduate Activities in Electrical Engineering," by W. J. Gibbs, D. Edmundson, R. G. A. Dimmick and G. S. C. Lucas.

NEWCASTLE-ON-TYNE.—Minor Durrant Hall, Oxford Street, 6.15 p.m. I.E.S. Newcastle Centre. "Brightness Engineering," by W. Robinson.

PORTSMOUTH.—Municipal College Extension, 6.30 p.m. I.E.E. Southern Centre. "A Logical Approach to the Problems of Electric Space-Warming," by D. H. Parry.

RUGBY.—College of Technology, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Electricity in Newspaper Printing," by A. T. Robertson.

SOUTHAMPTON.—Polygon Hotel, 7.30 p.m. Incorporated Plant Engineers, Southampton Branch. "High-speed Diesel Engines in Mobile Plant," by A. V. Driver.

TAUNTON.—Electricity Offices, 3 p.m. I.E.E. South-Western Sub-Centre. "The Economics of Low-Voltage Electricity Supplies to New Housing Estates," by F. G. Copland.

WOOD GREEN.—Three Jolly Butchers Hotel, 8.15 p.m. A.S.E.E. North London Branch. "Engines," by A. C. Parkes.

## Thursday, 4th December

BRADFORD.—Y.E.B., 45–53, Sunbridge Road, 7.30 p.m. I.E.S. Bradford Group. "Illumination and Illusion," by P. Hartill.

EDINBURGH.—University, 7 p.m. British Institution of Radio Engineers, Scottish Section. "The London to Kirk o'Shotts Television Cable/Radio Link System," by J. H. H. Merriman.

EXETER.—Providence Hall, Northernhay Street, 7 p.m. I.E.S. Exeter Group. "The Architect's Approach to Artificial Illumination," by R. G. Cox.

GLASGOW.—39, Elmbank Crescent, 6.30 p.m. I.E.S. Glasgow Centre. "Vision and Illumination," by A. Mellick.

LIVERPOOL.—Electricity Showroom, Whitechapel, 7 p.m. E.P.E.A. Merseyside Technical Group. "Thermal Problems in Cable Design, Manufacture and Operation," by J. Temple Hazell.

Exchange Hotel. Incorporated Plant Engineers, Liverpool & N. Wales Branch. Annual dinner and dance.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. "Economic Aspects of Overhead Equipment for d.c. Railway Electrification," by O. J. Crompton and G. A. Wallace.

(*Continued on next page*)

## NEXT WEEK'S EVENTS—*continued*

### Thursday, 4th December

LONDON.—At the Royal Society of Arts, Adelphi, 6 p.m. Institution of Engineering Inspection, London Branch. "The Gas Turbine: Its Present Position and Prospects," by A. W. Pope.

Rembrandt Hotel. Thurloe Place, Kensington, 7 for 7.30 p.m. Institute of Metal Finishing. Annual dinner-dance.

NOTTINGHAM.—Demonstration Theatre, E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "Street Lighting Practice," by J. Woodhouse.

### Thursday, 4th December, and Friday, 5th December

LONDON.—Church House, Westminster, S.W.1. British Institute of Radiology. Annual congress and exhibition.

### Friday, 5th December

BATH.—S.W.E.B. Lecture Theatre, Old Bridge, 7 p.m. I.E.S. Bath and Bristol Centre. "The Architect's Approach to Artificial Illumination," by R. G. Cox.

BIRMINGHAM.—Imperial Hotel, 12.30 for 1 p.m. Electrical Industries Benevolent Association, Birmingham Branch. Luncheon, followed by the annual general meeting.

BRISTOL.—Grand Hotel. Incorporated Plant Engineers, Western Branch. Annual dinner.

COLCHESTER.—Red Lion Hotel, 7 for 7.30 p.m. Ipswich and District Electrical Association. Annual dinner.

HUDDERSFIELD.—Electricity Showroom, Market Street, 7.15 p.m. I.E.S. Huddersfield Group. "Lighting Ideas for the Home," by Miss M. D. Wardlaw.

LEICESTER.—College of Technology, 6.30 p.m. I.E.E. East Midland Centre. "Diesel Electric Locomotives for Industrial Haulage," by F. D. Lester.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers, London Centre. "The London-Wenvoe Experimental Radio Link for Television," by W. J. Bray, R. L. Corke and R. W. White.

RUGBY.—Temple Speech Room, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Light from the Dark Ages or the Evolution of Electricity Supply," by A. R. Cooper.

# Stockholm Subway Extension

ON 26th October, Stockholm's Western Subway, which has cost £15,500,000 and has taken seven years to complete, was officially opened. The new line links the rapidly growing north-western suburbs with the city proper. It is 8½ miles long, 2½ miles being underground in the inner town.

Subway projects for solving the traffic problem in Stockholm date back to the beginning of this century. They did not materialize until 1933, however, when the first line was opened beneath the rocky hills of Södermalm, the southernmost of the four main inner-town districts which surround the old city of Stockholm. The Western Subway constitutes the second link in this scheme, while the third stage, connecting of the two existing lines, is expected to be completed in 1956. Plans for the further extension of the system have been drawn up.

About a third of the 2½-mile underground section of the new line had to be driven through granite and gneiss, and few supporting arches were required. There are 17 stations on the new line, including five underground ones within the city area. When utilized at full capacity the Western Subway will be capable of transporting an hourly total of 40,000 passengers in each direction, with a maximum of one six-car train every 90 seconds. Operations will start on a smaller scale, with one train every fourth minute.

The underground stations have been designed on a more or less uniform pattern. From the street level several entrances lead down to the ticket hall, which is also planned as a small commercial centre. From there the passengers pass to the subjacent 480ft platform via wide stairways; escalators facilitate travel in the opposite direction. The ample dimensions of the platform, designed for eight-car trains, and the bright one-coloured Upsala-Ekeby glazed tiles in shades of yellow, blue and grey, one colour for each station, give the underground halls a lofty atmosphere. Lighting is by groups of "Luma" fluorescent tubes. Largest of the underground stations is the Kungsgatan terminal in the heart of Stockholm.

Practically all equipment of the new subway is of Swedish make, but largely built under licence. American and European lines have been carefully studied. The dark-green subway cars, identical with those in service in New York, have been built on licence, ASEA furnishing the electrical equipment. Designed for a top service speed of 42 m.p.h., the cars are powered by four 108 h.p. motors, one for each pair of wheels. Three pneumatically operated double doors on each side permit of easy entry and exit during the 30 seconds allowed for stops at the stations.

Electricity is supplied via a third rail, which is provided with a top wooden cover to prevent accidents.

A novelty for subway cars is the cab signal system. Electric impulses in the rails are registered on a signal board in the driver's cabin. When the board marks an H, the driver may use top speed, while M means medium speed, 30 m.p.h., L low speed, or 9 m.p.h., and S, stop. Should the stipulated speed be exceeded a buzzing sound warns the driver, followed in a couple of seconds by the automatic release of the emergency brake if the speed is not reduced.

# CONTRACT INFORMATION

## Accepted Tenders and Prospective Electrical Work

### CONTRACTS OPEN

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.*

**Bridgend.**—6th December. U.D.C. Street lighting equipment. (See this issue.)

**Brighouse.** — 18th December. Corporation. Street lighting equipment. (See this issue.)

**Dagenham.**—6th December. Town Council. Street lighting scheme. (See this issue.)

**Newbiggin (Northumberland).** — 20th December. U.D.C. Electrical installations in 16 houses on the Spital estate. Surveyor.

**Newcastle - on - Tyne.** — 10th December. City Council. Substitution of electric lighting for gas in 930 houses on the Walker housing estate. G. Kenyon, city architect, 18, Cloth Market.

**Portuguese East Africa.** — LOURENÇO MARQUES.—17th December. Ports, Railways and Transport Administration. Various electrical equipment. (C.R.E. 38027/52. Ten/5158.)*

**Southampton.** — 22nd December. Corporation. Electrical installation at Heathfield County Primary School.

**Spalding.**—8th December. R.D.C. Pumping machinery for the waterworks, complete with switchgear, starters, etc. Deposit: £5. Forms from Silcock & Simpson, engineers, 10, Park Row, Leeds, 1.

**Uruguay.** — MONTEVIDEO. — 18th December. Administracion Nacional de Combustibles, Alcohol y Portland. Fluorescent lighting fittings and tubes. (C.R.E. 38821/52. Ten/5171.)*

26th December. Usinas Electricas y Telefonos del Estado. Supply of insulating material. (C.R.E. 38813/52. Ten/5140.)* 23rd December. Accessories for h.v. lines. (C.R.E. 38812/52. Ten/5150.)*

### ORDERS PLACED

**Bedford.**—Additional street fluorescent lighting in Ampthill Road (£2,471).—Metropolitan-Vickers.

**Hull.**—Education Committee. Accepted. Electrical installation works at the Wivern County Primary School (£2,948).—J. Todd.

**London.**—L.C.C. Rivers and Drainage Committee. Electrical installation work for new primary sedimentation tanks at the northern outfall works, Beckton (£36,665).—London Electricity Board.

ST. PANCRAS.—Borough Council. Street lighting equipment in Highgate Road, Highgate West Hill, South Grove and Royal College Street (£6,828).—Engineering & Lighting Equipment Co., Ltd.

HOLBORN.—Borough Council. Electrical installations in 58 flats at Red Lion Square, W.C.1 (£4,270).—Gratte Bros., Ltd.

LEWISHAM.—Works and Highways Committee. Recommended. Lighting of pedestrian crossing beacons (£1,007).—Revo Electric Co., Ltd.

**Plymouth.** — Corporation. Recommended. Street lighting installation, Alexandra Road (£1,018) and Wolseley Road (£3,733).—G.E.C. Electrical work for Council Houses, Crownhill estate (£1,672).—Madge & Son.

**Smethwick.**—Education Committee. Recommended. Electrical installations at Albion Junior School (£2,552).—Harris & Sheldon, Ltd.

### WORK IN PROSPECT

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Ashby (Leics).**—Houses (32), Moira Road estate; Council's architect.

**Ashton - in - Makerfield.** — Further 102 houses at Landgate Lane site; U.D.C. surveyor.

**Bolton.**—Residential nursery; borough engineer.

**Boston.**—Reconstruction of Broadfield depot at cost of £37,000 (scheme approved in principle); borough surveyor.

**Bournemouth.** — Showroom and shop premises with flats over, Kimberley Road; N. Wimborne, 34, Grove Road.

**Burnley.** — Flats (52), New Palace House estate; borough surveyor, 22-24, Nicholas Street.

**Bury.**—Extensions to bleach works (£80,000); Oliver Ormrod, Ltd., furnishers, etc., Birtle Bleach Works.

**Carlisle.** — Crematorium, Carlisle Cemetery; city engineer, 18, Fisher Street, Carlisle.

**Cheltenham.**—Development of site at Lances, Pitville Street, providing for shops, flats, etc. (£180,000); borough surveyor, Municipal Offices.

**Chingford.**—Houses (120), on three sites; borough surveyor, Town Hall, E.4.

**Consett.**—Houses (140), Gloucester Road, for U.D.C.; J. J. Eltringham, architect, Derwent Street, Blackhill, Co. Durham.

**Crook.**—Conversion of Holmfield into old people's hostel (£19,200); county architect, Court Lane, Durham.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

**Cumberland.**—Old people's hostel at Whitehaven; county architect, Portland Square, Carlisle.

**Daventry.**—Extensive additions to premises; Daventry Engineering Co., Ltd., Oxford Street.

**Doncaster.** — Houses (16), Warmsworth (£20,825); borough architect.

**Dudley.** — Houses (500), Saltwells estate; F. H. Gibbons, borough surveyor, Council House.

**Durham.** — Children's homes at Tow Law, Fence Houses and Bowburn (£13,500); county architect, Court Lane.

Medical centres at 22 pits; N.C.B. Architects' Dept., Ashfield Tower, Gosforth, Northumberland.

**Eastbourne.**—Laboratory building at Brampton Road, Hampden Park; H. Hubbard Ford, architect, 20, John Street, London, W.C.1.

**Eastry.**—Houses (50), during 1953; R.D.C. surveyor, Dover Road, Sandwich.

**Gellygaer.**—Three shops and flats, Bargoed; U.D.C. surveyor.

**Harrow.** — Dwellings (35), at Antoneys, Uxbridge Road, Pinner; J. H. Melville Richards, surveyor, Council Offices, Harrow Weald Lodge.

**Hoole.**—Houses (32), Hoole House estate; R. Boot, architect, 22, Newgate Street, Chester.

**Isle of Axholme (Lincs).**—Houses (10), Epworth; R.D.C. architect, Crowle, Lincs.

**Leigh.** — Accident and consultation block at Infirmary; Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.

**Lincoln.**—Sub-divisional police headquarters at Bracebridge Heath, with police houses; J. W. H. Barnes, county architect, County Offices, Sleaford.

**London.**—CITY.—Offices, Cheapside and Watling Street; Victor Heal, architect, 14, Gray's Inn Square, W.C.1.

LEWISHAM. — Synagogue in Crantock Road; United Synagogue, Upper Woburn Place, W.C.1.

**Manchester.**—Extensions to Arts Library at University (£350,000); T. Worthington & Sons, architects, 176, Oxford Road, Manchester.

**Mansfield.**—New central kitchen unit at Victoria Hospital; Vallance & Westwick, architects, White Hart Chambers, Mansfield.

**Market Drayton.** — Modern school (first portion to cost £154,000), for Salop E.C.; A. G. Chant, county architect, Column House, London Road, Shrewsbury.

**Mere.**—Water pumping station; T. Ward Whitfield, consulting engineer, Hilperton, Trowbridge.

**Middlesbrough.**—Additions to fire brigade headquarters for the T.C. (£9,000); borough engineer.

**Mitcham.**—Maisonnettes (66), Baron estate; E. H. Smith, Ltd., builders, 48, Wellesley Road, Croydon.

**Newcastle-on-Tyne.** — Children's home, Priorsdale (£10,700); county architect, County Hall, Newcastle.

**North Shields.** — Erection of factory at Preston; Foots, Ltd., box makers, Foots Building.

**Norwich.**—Proposed factory on eight-acre site at Harford; Ballys, Ltd., shoe manufacturers, Queen Street, Norwich.

**Oldbury.** — Houses (216); Titford Property Co., Ltd., Langley.

**Pembroke Dock.**—Fire station (£40,000), on site near Bush Camp; W. B. Kavanagh, borough surveyor, Municipal Offices, Pembroke Dock.

**Plymouth.** — Conversion of Ingleside, Tavistock Road, into old people's home, and five-storey block of shops and flats, King Street; city architect.

**Reading.**—Mid-West Secondary School for Boys (£195,000); borough architect.

**Richmond (Yorks).**—Houses (12) Scotton; R.D.C. surveyor, 56, Market Place.

**Romiley.**—Additions and alterations to Oakwood Hall to form a remand home, for Manchester Corporation Children's Committee; city architect, Town Hall.

**South Shields.**—Outpatients' department at Ingham Infirmary for Newcastle Hospital Board, Osborne Road, Newcastle-on-Tyne (£15,000); P. H. Knighton, Board's chief architect.

**Stourbridge.**—Erection of new college of further education; F. Gibberd, architect, 8, Percy Street, London, W.1.

**Sunderland.** — Outpatients' department at Sunderland Royal Infirmary; S. W. Milburn & Partners, architects, 9, Esplanade, Sunderland.

Houses (800), Hylton Red House estate; borough architect, Grange House, Stockton Road.

Houses (236), Castletown estate; L. W. Evans, Ltd., builders, 18, Norfolk Street.

**Surbiton.**—Works extensions; Fine Tubes, Ltd., King Charles Road.

**Sutton and Cheam.**—Dwellings (26), on two sites in Benhill Wood Road, Sutton; M. H. Michell, borough surveyor, High Street, Sutton, Surrey.

**Swansea.** — Showrooms, Oxford Street, for Darals Fabrics, Ltd.; G. Davies, Ltd., builders, Northampton Building Yard.

**Wallsend.**—Nurses' home, Denbigh Avenue, for Northumberland C.C.; county architect, County Hall, Newcastle-on-Tyne.

Terrace houses on the Low Willington Farm estate; J. Walter Hanson & Sons, architects, 123, Northumberland Street, Newcastle-on-Tyne.

**Watergate Colliery.**—Pithead baths, canteen and medical clinic; N.C.B., Gosforth, Newcastle-on-Tyne.

**Welton.**—Houses (36), Fiskerton; William Saunders & Partners, architects to R.D.C., 24, Castle Gate, Newark.

**West Bromwich.**—Factory at Bromford Lane site; Sillett & Cooksey, Ltd.

Houses (40), Hill Lane; L. Bullivant, architect, 103, Bristol Road, Birmingham.

**West Hartlepool.**—Electrical work at the new Rossmere County Primary School; borough architect, Municipal Buildings, West Hartlepool.

**Wigan.**—Omnibus depot in Crompton Street; Allan Royle, town clerk, Library Street.

**Witham.**—Houses (64), Howbridge Road; Dyke Harrison, Ltd., Navigation Road, Chelmsford.

**York.**—Dwellings (290), Chapel Fields estate; city architect.